THE MODEL ENGINEER

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The MODEL ENGINEER

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SMOKE RINGS

Our Cover Picture

● FOR THIS special issue we decided to choose special treatment for a rather special subject. Mr. R. G. Orr, of Melbourne, Australia, had sent us a description and illustrations of a fine free-lance 4-6-2 type locomotive for 5-in. gauge, built by Mr. J. J. Mahoney, also of Melbourne. Among the illustrations were two small colour transparences, from one of which our cover has been prepared.

It was decided that the design should be influenced by the L.M.S. practice, and the remarkable thing about it is that, in general outline and external detail, Mr. Mahoney has produced a model almost identical with a four-cylinder compound 4-6-2 which the late Sir Henry Fowler designed, but never built for the old L.M.S. Railway.

We shall be publishing the whole story of Mr. Mahoney's fine creation very shortly; meanwhile, readers may care to study and admire its portrait in full colours.

The Giant Model Airship

● THE FLIGHT of any kind of airship is a spectacle which appeals immensely to a large cross-section of the public; yet few people in Britain can recall actually having seen one.

At this year's MODEL ENGINEER Exhibition, every visitor will be afforded this opportunity. The giant model airship, controlled by radio, will be demonstrated daily throughout the period of the show, and will manoeuvre in the "upper space" of the hall. Of 70 cu. ft. capacity, the airship is constructed on the rigid principle to a length of 12 ft. 6 in. Power is supplied by a miniature internal combustion engine.

National Locomotive Rally at Birmingham

● THE BIRMINGHAM Society of Model Engineers will be holding another National Locomotive Rally, at the spendid track at Campbell Green, on Saturday and Sunday, September 8th and 9th next. A warm welcome is extended to all clubs and lone hands; admission is by ticket only, free of charge.

3½-in. and 5-in. gauge locomotives are especially catered for, and owners of these should send in their applications, *accompanied by a stamped addressed envelope*, to the hon. secretary, Mr. Roland Phillips, 92, Gilbertstone Avenue, South

Yardley, Birmingham 26, who will gladly send tickets by return. Applicants should state the date and time of arrival so that a running schedule for their engines can be prepared.

Circumstances Alter Cases

● A READER who owns a 1¼ in. by 1¼ in. steam engine, which has to be driven by compressed air instead of steam, is in trouble with the lubrication of the cylinders. The engine is fitted with a displacement lubricator which, our friend complains, does not work, and he appears to be puzzled as to the reason for this and asks if there is any remedy.

The reason for the failure of the lubricator is due simply to the fact that compressed air is not steam. A displacement lubricator works, as its name implies, by the displacement of the oil, and the substance that displaces the oil is water condensed from the steam. Since compressed air contains little, if any, moisture, there is nothing to displace the oil, and so the lubricator fails to work when air is used instead of steam.

There are two remedies, either of which is effective. One is to use an ordinary hand oiler to inject oil into the steamchest and cylinders through any cocks that may be fitted to them ; the other is to replace the displacement lubricator by a mechanical one, or any other kind of force-feed system. The latter remedy need not be at all complicated, and is easily adjustable to meet requirements ; but it will work no matter how the engine is driven, in this way possessing an advantage over the displacement system.

Arts and Crafts in Ashford, Kent

● WE HAVE been advised that the Rotary Club of Ashford, Kent, is organising its first exhibition of arts, crafts and hobbies. Three halls have been booked, namely : North Street Hall ; Geerings, 80, High Street, and C. Hayward & Son, New Street.

The official opening will take place at 3 p.m. on Wednesday, September 19th ; on Thursday and Friday, September 20th and 21st, the halls will be opened at 10.30 a.m. All entries for the competition, in which there are no fewer than thirty-three classes, must come from competitors living (or attending school, association, institute, etc.) within a six-mile radius of Ashford Council Chambers.

Our informant, Mr. K. L. Hebden, 47, Albert Road, Ashford, Kent, is a member of the committee concerned with the organisation, and is interested in the model engineering section. He would be glad of the loan of models for that section, and if any reader can lend one, would he get into touch with Mr. Hebden at the address just given ? Incidentally, a model threshing machine built by Mr. Hebden was described and illustrated in our issue for October 5th last.

S.R. "Leader" Class Locomotives

● WE HAVE lately been receiving letters from provincial and overseas readers who tell us that they will be visiting London during the late summer and early autumn, and they want to know where they will be able to see some of the much-discussed "Leader" class locomotives at work. We are sorry if we have to disappoint our correspondents, but the plain fact is that the Southern Region mechanical engineering authorities have scrapped the engine referred to, because they were entirely unsatisfactory from the operational point of view.

Only one of these engines was ever fully completed and put on trials, which extended over three years or so ; in spite of strenuous and costly efforts on the part of the British Railways' technical staff concerned, the engine was anything but successful and nothing like reliable enough to be placed in regular traffic. As a machine, a power generator and a vehicle, the engine fell far short of requirements, whatever its merits may have been as an experiment.

The second engine of the class was practically finished, but was never put on the road, and the three others in various stages of construction were dismantled.

Once again has an attempt to break away from simple, straightforward steam locomotive design ended in failure, a fate which was widely anticipated at the time the first example of the class appeared.

Railway Superelevation

● THE COVER picture of our August 2nd issue aroused considerable interest, but our belief that the superelevation of the track is 3½ in. fell a little short of the fact. We are informed that the maximum superelevation used by British Railways is 6 in., and this is the actual amount at Penrith ; so no wonder the engine looks as if she is about to topple over !

This amount of superelevation is used on main line curves of 35 chains or less radius. Of course, superelevation of any amount is not suddenly applied, but is built up gradually as the curve is entered (or vice versa as it is left) ; the result is that the train glides smoothly round a curve, without shock, and gradually tilts over inwards to counteract the effect of centrifugal force which would, otherwise overturn the train outwards.

Among the many letters we received on this subject was one from Mr. F. J. Streets, who is a platelayer on the Eastern Region main route to Scotland and works just north of Selby, Yorks. He states that a small stretch of the Up line has an elevation of 4¼ in., on which there is a speed restriction of 50 m.p.h. He also mentions that the Severus curve, just north of York, used to have 6 in. superelevation, but he is not certain if it still has. We were particularly pleased to receive Mr. Street's letter, because we have always admired the work of that stalwart and ever-vigilant railwayman, the platelayer.

Calling South Norwood

● MR. JOHN RUSSELL, 42, Sunny Bank, South Norwood, S.E.25, would like to get into touch with any model engineers interested in forming a club in that area. He is a regular reader of THE MODEL ENGINEER and an enthusiast for steam locomotives. If any reader cares to follow up this idea, he is invited to communicate with Mr. Russell at the address given above.

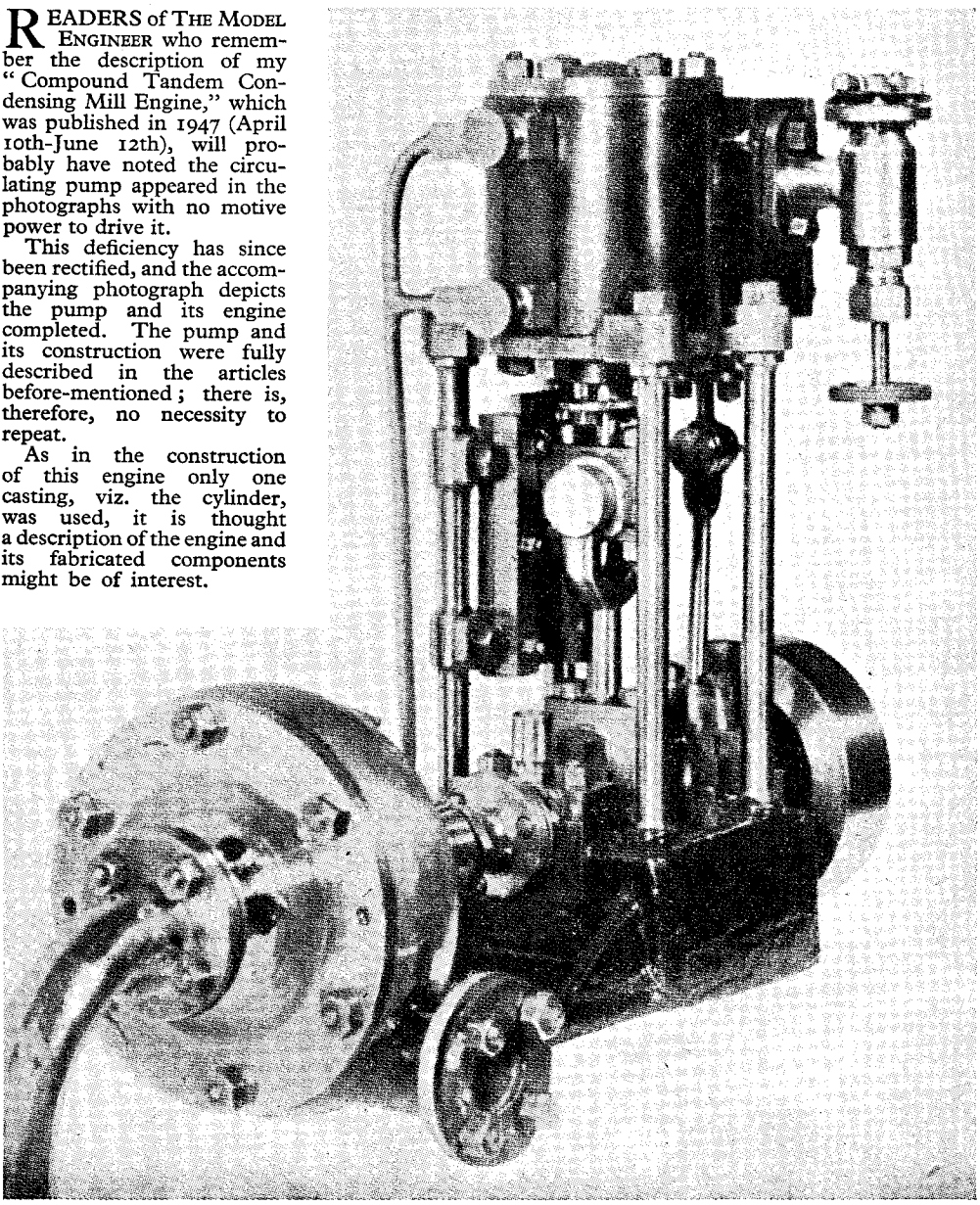
A Vertical Steam Engine and Centrifugal Pump

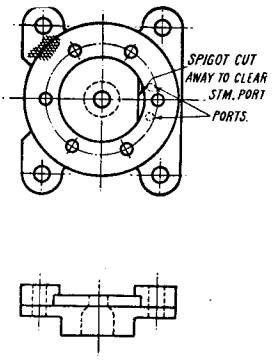
by "Crank Head"

READERS of THE MODEL ENGINEER who remember the description of my "Compound Tandem Condensing Mill Engine," which was published in 1947 (April 10th-June 12th), will probably have noted the circulating pump appeared in the photographs with no motive power to drive it.

This deficiency has since been rectified, and the accompanying photograph depicts the pump and its engine completed. The pump and its construction were fully described in the articles before-mentioned; there is, therefore, no necessity to repeat.

As in the construction of this engine only one casting, viz. the cylinder, was used, it is thought a description of the engine and its fabricated components might be of interest.





Figs. 1 and 2

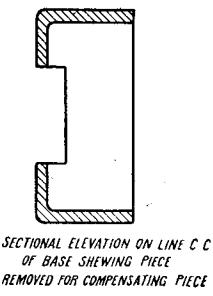
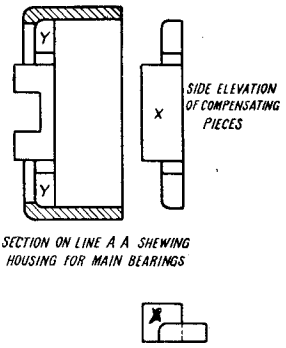


Fig. 5



Figs. 6 and 6A

The engine is designed for high speed, the bore of the cylinder being $\frac{7}{8}$ in. dia., and the stroke $\frac{3}{4}$ in., steam admission being controlled by an ordinary "D" slide-valve and eccentric.

The casting of cylinder was originally intended for a vertical feed pump, supported by three columns, consequently three lugs were cast on the cylinder. The position of these lugs rendered them useless for the engine now being described, so they had to be removed. The absence of lugs for the four columns created the first problem to be solved. The method I adopted is not considered good engineering practice, but it is, nevertheless, successful, and so far, no trouble has been experienced due to weakness, and the engine has been run flat out at a pressure of 120 lb. per sq. in. on compressed air.

Figs. 1 and 2 show a plan and elevation of the bottom cover, which takes the top of the four columns supporting the cylinder, and was turned from a piece of cast-iron to the dimensions shown (the drawings are reproduced half-size). The bottom flange of the cylinder was turned to a tight fit between the lugs as shown by the cross hatching, Fig. 1. The bed of the engine was the next job to be tackled, and this was made from a piece of $\frac{1}{8}$ in. thick sheet brass cut as indicated in Fig. 3. The four sides were flanged, and the joints at the corners silver-soldered internally. It will be noted that one side of the box bed is square, whilst the other three are slightly flared, the reason for the one vertical side was to make the connection with the bedplate carrying the pump more simple. Fig. 4 shows the box bed as flanged and silver-soldered. Provision now had to be made for housing the main bearings. These were let down into the base in the manner depicted in sectional elevation at Fig. 5. Two pieces of brass were then made as Fig. 6 and 6A, and the bedplate was cut at each end (see Fig. 5). These spaces were then filed up, with the bottom of the space parallel with the bottom of the base (which latter, by the way, was the datum from which all other measurements were made) the ends of the spaces being made truly square with the datum line, and the portions marked *X* Figs. 6 and 6A carefully fitted in the spaces prepared for them, the other portion

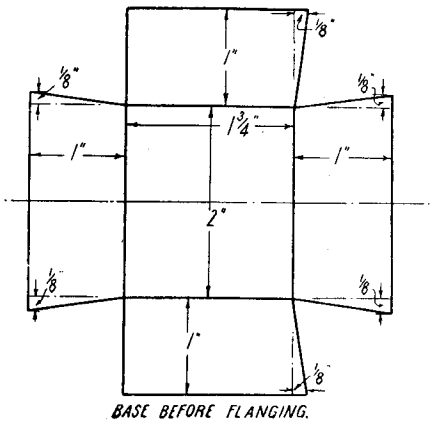


Fig. 3

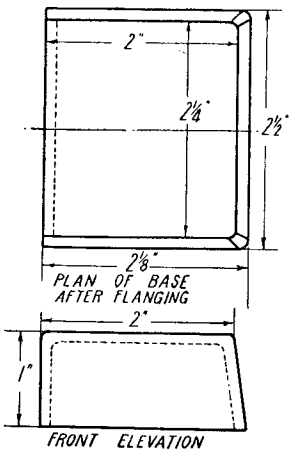
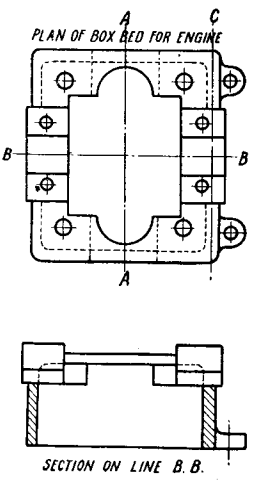


Fig. 4



Figs. 7 and 7A

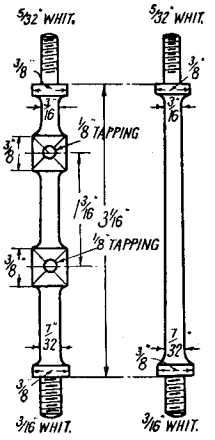
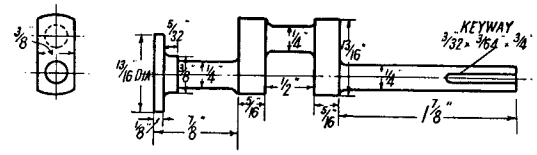


Fig. 8



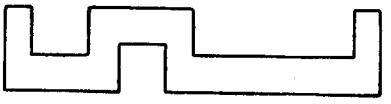


Fig. 9

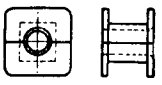


Fig. 10

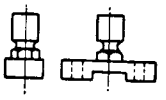


Fig. 11

being made to fit the inside of the base. (See *Y*, Fig. 6.) Lugs were also left on these portions in order to reinforce the base where the columns would eventually be screwed in. They are shown by dotted lines in Fig. 7, which figure is also a plan of the base with the compensating pieces in place, and the housings machined out to hold the main bearings. It should have been stated that these compensating pieces were also silver-soldered in place. The base was now as solid as a casting could have been. It will be noticed in Figs. 5, 6 and 7 the base is shown with all sides vertical. This is due to an oversight on the writer's part when making the drawings. Figs. 3 and 4 will show the true shape ; although, there is no reason why all four sides should not be made as in Figs. 5, 6 and 7. The centre portion of the top of base was now cut out as in Fig. 7 to allow the crankshaft, etc., room for working in. The holes for the four columns were next marked off, drilled, tapped $\frac{3}{16}$ in. Whit. and spot-faced. This operation required a little care, as the face of each hole must be in the same plane, and also the same vertical distance from the datum line ; as, on this depends the whole vertical alignment of the engine.

The four vertical columns (Fig. 8) were next taken in hand, turned and screw-cut between centres. Here again care must be exercised to get the length of all four columns exactly alike between the collars. The two rear columns are made with collars left on them, to which the slipper slide for the crosshead will eventually be secured. Having made and fixed the columns, the holes for their reception were now marked off on the cylinder bottom cover and drilled 5/32 in. clearing size. The cover was then placed on the columns, nuts put on, and the bearing surface for cylinder carefully checked over to ensure it being parallel with the base. This test having been overcome, the holes for jointing bottom cover and cylinder were then marked off, drilled and tapped $\frac{1}{8}$ in. Whit. and the studs made and fitted. The cylinder was now tried in place, and the valve face checked up to ensure the fact that it was square with the base. These operations just described took a bit longer to carry out than was anticipated, so a change was considered desirable, and the crankshaft was next taken in hand. This component was turned in one from a piece of mild-steel $\frac{3}{8}$ in. thickness, and was marked off in the usual way, drilled, chipped, and filed to shape shown in Fig. 9. Pieces were left on the ends for the purpose of taking the centres when turning the crankpin, and other than this, there was nothing unusual about the job, with the exception, of course, of the usual period of fear and trembling when finishing the crankpin ; parting tools being what they are, one feels a little apprehensive during the last two or three cuts. However, luck was with me, and eventually the job was done, and as far as I could tell was as near true as possible.

The crankshaft being made attention was next directed to the main bearing brasses (Fig. 10). These were made of bronze and a snug fit in the housings in base, and bored 0.003 in. less than diameter of journals, this to allow for reaming when in position. The keeps, Fig. 11, were then made and fitted, studs inserted and bearings screwed down into position. A long reamer, $\frac{1}{4}$ in. diameter, was then passed through bearings, thus ensuring as far as possible, correct alignment. The crankshaft was now tried in its place, and, after minor attention to the brasses with a scraper, the oil holes were drilled, and oil ways cut, and the crankshaft placed finally in position. A check was then made of the distance between crank journals and jointing surface of cylinder bottom cover. This being satisfactory, work was commenced on piston and connecting-rods. (Figs. 12 and 13.) These fittings were both of mild-steel and made from round stock. Here again a considerable use of the hacksaw and file was called for. Taking the piston rod first, there is not much of note in its construction excepting perhaps for the slipper, Fig. 14. This is made of bronze and is a tight fit on the crosshead and is held in position by two 3/32 in. cheese-head screws. The latter, when finally screwed up

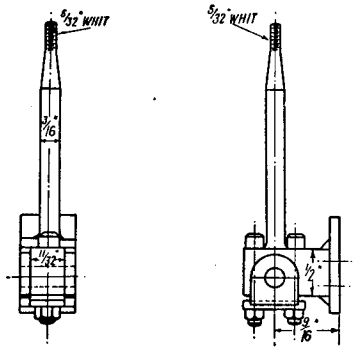


Fig. 12

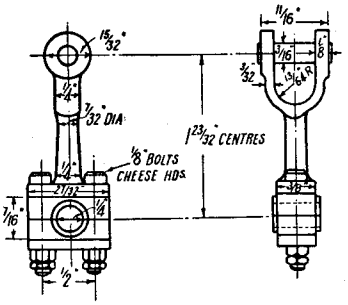


Fig. 13

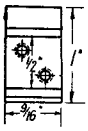
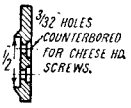


Fig. 14



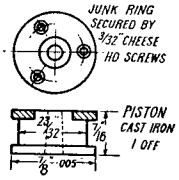
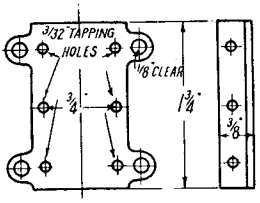


Fig. 16



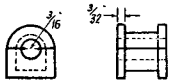


Fig. 15

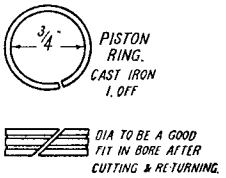
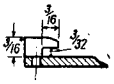


Fig. 16A



Figs. 17 *and* 18

should be sweated, or locked by some other appropriate means. It will be realised, should one of these screws work out whilst the engine is running, a nasty mess would most likely result. The slipper should not, however, be brought down to its finished thickness until the cylinder, piston, gland, piston-rod and slipper slide are fixed. This procedure will enable the correct thickness of the slipper to be arrived at.

The piston and its rings were now made, all of cast-iron (Fig. 16), the piston being turned 0.005 in. smaller in diameter than the bore of the cylinder, the junk ring, of course, being made to the same dimension. It is secured to the piston by three cheese-head 3/32 in. screws, whose heads are let down into counterbores in the junk ring. This is not shown in the sectional drawing of the ring. The piston is bored 5/32 in. and reamed to the same taper as a standard taper pin; a reamer of this size was available, so was used, and no difficulty has been experienced in removing piston from the rod. The piston ring was next made (Fig. 16A) and it will be noted that bore of piston ring is 1/32 in. greater than the diameter of the piston waist over which it fits; but in width, it must be a good working fit between the junk ring and flange on bottom of piston.

To revert to the piston-rod, the end of this was turned taper to fit piston, and to ensure no leakage of steam, was lightly ground in piston with very fine carborundum paste, the piston being fixed by a 5/32-in. bronze nut. The crosshead brasses, Fig. 15, are much the same as main bearing brasses, except for the fact that the top half is half-round to fit the housing in crosshead, and the keep must be a good fit between the flanges.

Before proceeding with the connecting-rod, the slipper slide was made and bolted to the two near columns, and this is shown at Fig. 17. The slide is of mild-steel plate, and must be parallel in its thickness, and the working face scraped up to the surface plate. The stud holes for securing guides may be drilled and tapped, and studs fitted. At this stage, there is no necessity to fit the guides. Reference to Fig. 18 will give all details of the guides, which should be of mild-steel. The connecting-rod does not call for much comment other than to note that the gudgeon-pin is shrunk into the forked end of the rod. Other details may readily be obtained from Fig. 13. The eccentric-rod, Fig. 19, is merely a replica of the connecting-rod but smaller in size, the eccentric strap taking the place of crank-head brasses in the connecting-rod. The eccentric straps, Fig. 20, are of bronze and were cut to shape but slightly over the finished size. These were left $\frac{1}{16}$ in. thicker than finished size at the joints, Fig. 20. The holes for the bolts holding the straps together were marked off and drilled

to size for the bolts. The straps were then parted by sawing across the centre of lugs, the joints filed square up and straight, and with two ⅛ in. pins placed in the bolt holes to maintain alignment the two portions were sweated together. When cold, the pins were removed, and replaced by the bolts. The bore in which the sheave was to revolve was then marked off, taking

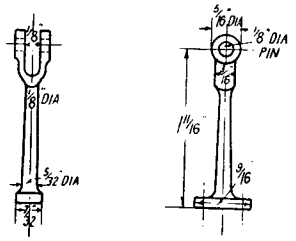


Fig. 19

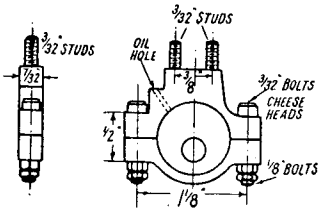


Fig. 20

crankshaft. The sheave is drilled 45 deg. from the vertical, and tapped 3/32 in. Whit. to accommodate a silver-steel grub-screw. This is used to hold the eccentric in position on the crankshaft after the valve setting has been done. The screw is made as diagram (Fig. 21A), the point being drilled up as shown in section, and screw then hardened on the point only.

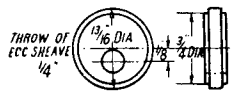


Fig. 21

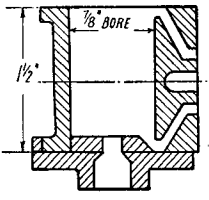


Fig. 23

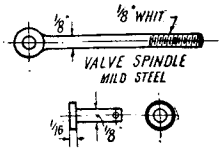


Fig. 22

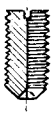


Fig. 21A

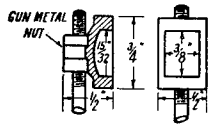


Fig. 24

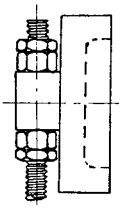
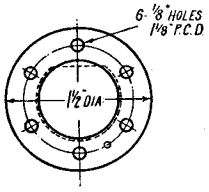


Fig. 24A



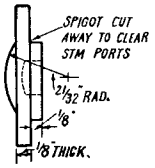


Fig. 25

care that its centre fell on the line of the joint. The straps were then held in the chuck, and bored to finished size, in this case ¾ in., midway between the faces of the strap. A groove ⅛ in. wide and 1/32 in. deep was turned to take the tenon which is turned on the eccentric sheave. (See Fig. 21.) The stud holes for foot of eccentric-rod were then drilled, and studs fitted, the bolts were removed, and joints cleaned off; the straps were then bolted together again, in readiness for fitting the eccentric itself. The eccentric, Fig. 21, was then turned to size from a piece of cast-iron rod, but before parting off from the rod, was faced up, and marked off for boring. The throw of the eccentric in this case is ⅛ in., making a stroke of ¼ in., which is correct for the valve. The bar from which the sheave was turned was held in the four-jaw chuck, so all that was necessary was to throw the whole thing ⅛ in. out of centre, and all was well for boring. This movement in the chuck must be carefully done, otherwise the whole thing will run out of truth when mounted on the

The valve spindle, Fig. 22, needs no description. The same remark applies to the cylinder, Fig. 23, and valve chest, Fig. 26. With reference to the slide valve, Fig. 24, since the design was prepared the valve has been slightly modified, inasmuch as instead of slotting this across the back, as shown in sketch, the lug on the back of valve has been drilled right through. In place of one nut being fitted, as shown in Fig. 24, this would preclude the setting of the valve to anything finer than 1/80 in.

The valve spindle was screwed a bit farther down from the end, and two nuts fitted as diagram, Fig. 24A. This method allows for a much more accurate setting of slide-valve. Other than this, the valve is as per drawing.

The flywheel, Fig. 27, is turned from a piece of mild-steel bar, and is as shown. Had there been room in the position in which the engine is mounted, the wheel would have been at least ¼ in. larger in diameter.

Fig. 28 is an enlarged view of the connection of

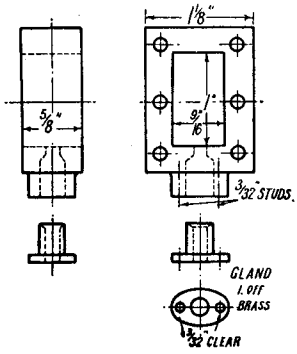


Fig. 26

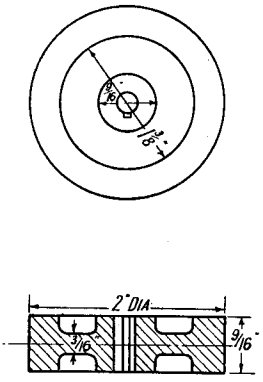


Fig. 27

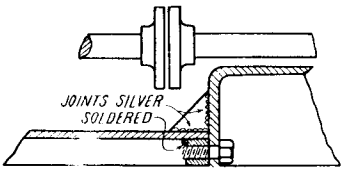


Fig. 28

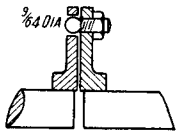


Fig. 29

the pump bedplate, with that of the engine, and does not call for much in the way of explanation.

The coupling between the crankshaft and the pump shaft is shown enlarged in Fig. 29. This form of coupling has proved satisfactory, and is designed to allow for any small error in alignment of the two shafts. The coupling on crankshaft is of steel, whilst that on the pump is of bronze. The bolts are mild-steel.

In conclusion the engine was designed to work with steam up to 120 lb. per sq. in., and to run at high speed. It has been run on air at this pressure, and it appears that it would have run itself to destruction if permitted to do so.

Unless the writer gets bitten by another bug, it is thought the compound tandem mill engine can now be considered completed ; this state of affairs indicates the necessity for a boiler to drive the engines ; well, a boiler has since been made, and with the Editor's approval will be described at a later period. Some trials of the boiler have been carried out but cannot be called conclusive. The difficulty has been the absence of a feed pump large enough to supply the water required. It may be stated that the boiler is oil-fired, and runs under forced draught, the working pressure being 150 lb. per sq. in. and hydraulic test pressure 300 lb.

More Appreciation

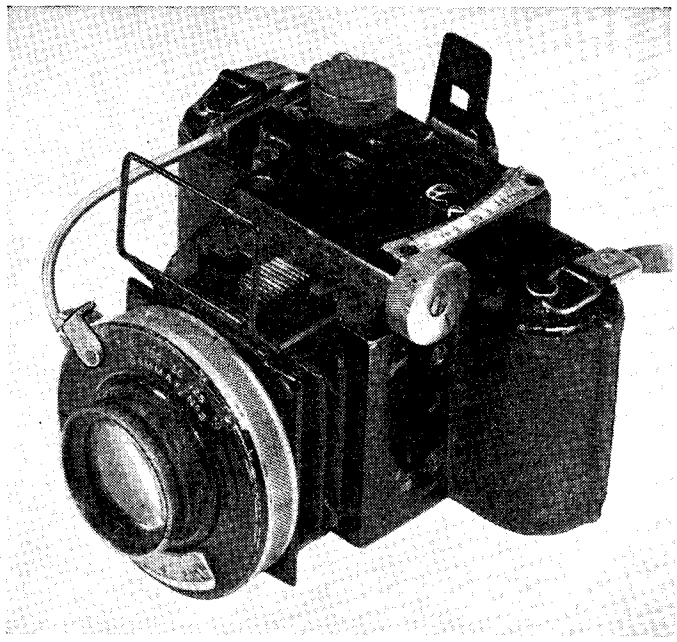
In the course of a letter from a London reader, Mr. J. C. Stevens, the following comment occurs : " As a reader of THE MODEL ENGINEER over many years, I would like to compliment you on the high standard you maintain in your journal. There is nothing else published which remotely compares with it—those which I see are the most disjointed and scrappy periodicals, attempting to cover ' everything ' and succeeding in achieving nothing. Your journal is undoubtedly *The Times* in its sphere."

This is high praise indeed, and it helps us, as we have pointed out before, to maintain our efforts to satisfy our readers. Our policy, however, is governed, first, by our postbag and, secondly, by what we learn from our close and constant touch with so many of our readers.

Events move fast in the technological world today, and they have their repercussions on our hobby ; but we are ever on the alert to keep pace with them so that model makers can have the benefit of the latest methods of applying workshop equipment to their craft, even if the facilities are of the humblest.

From one point of view, there is something paradoxical about model engineering ; for example, the art of using a file or a drill may be as old as files and drills ; yet, in spite of new ideas and the application of those new ideas, the art remains ever the same ! But this is no indication that our hobby is standing still ; on the contrary, it is progressing at a greater pace than ever before and THE MODEL ENGINEER must at least keep up with it. That is our aim, and the friendly co-operation of thousands of readers aids our efforts to reach the target.

Notes on the Design of a 35 mm. Camera



by
Raymond F. Stock

THE interest recently displayed in amateur-constructed cameras apparently demonstrated one point—that no one type of camera can fulfil the diverse requirements of all photographers.

When about three years ago I made a camera I decided on a 35 mm. miniature for the following reasons :—

With normal care half-plate prints can easily be made ; the economy in negative material is very considerable ; processing is simple and economical ; auxiliary equipment is cheaper or alternatively easier to make ; storage space for all the equipment is reduced ; and the camera is easier to carry and operate, a not unimportant point if it has to accompany the owner on, for instance, a field day.

The above considerations might well be offset in a commercial camera by the current prices of miniatures. The cost of an amateur-built camera is, however, virtually that of the lens and for a given aperture and $\frac{focal\ length}{picture\ diagonal}$ ratio will vary almost directly with the film size.

My own requirements for a camera were those of the average photographer but with an emphasis on the photography of models both in action and on the bench ; since the majority of model engineers proposing to construct a camera would probably have similar requirements, the following description may be of interest.

Design

I had at the time an f2.9 3 in. Pentac lens in an indifferent shutter giving T., B., 1/10 1/25, 1/50 and 1/100 of a second exposures.

At the time I had no access to machine tools so the construction of a focal plane shutter appeared impracticable ; I decided to accept the shutter/lens combination as it stood and, in fact, have not yet found speeds below 1/100 to be essential, though I should add that my main modelling interest is in radio control and not hydroplanes !

3 in. may seem a long focal length to cover the 35 mm. format of 24 × 36 mm., but it has its advantages in improving the image size in distant work, whilst in close-ups it helps to avoid distorted perspective.

In the photography of models the most useful feature in a camera is an ability to focus down to a foot or two without supplementary lenses. A few simple calculations showed that an inordinate camera extension is required for object distances below 1 ft. and I compromised on focussing down to 18 in. which required the lens/film distance to be 3.6 in., a total focussing movement of 0.6 in.

There seemed no point in departing from the orthodox arrangement of elements in this class of camera, and the basic design was made by drawing the body as the minimum profile that would contain the separate elements ; the arrangement is indicated in Fig. 1.

It will be seen that the walls of the central box in which the image is formed are spaced out from the edges of the focal aperture. This, although slightly increasing the overall size, was done to minimise oblique reflection from the walls with a possible chance of fogging the film.

The central compartment was made asymmetrical, being enlarged on one side to accommodate the film wind sprockets and shaft clear of the picture area. An alternative method is to place the sprockets above and below the focal aperture and gear them individually to a common shaft ; this saves some room but with only

hand tools available I decided to use the simpler method.

I considered the use of Leica cassettes but eventually used the Agfa type. In case these are unfamiliar to the reader I illustrate one in Fig. 2.

I believe they were originally intended to be expendable, but I have been using mine continuously since 1948 and found them very satisfactory. They are pressed from light aluminium sheet with a slit in one side fitted with a velvet light trap : a spring at each end assists in coiling the film, which is simply pushed in by hand in the darkroom when loading.

Two of these cassettes, identical, are used in the camera and the film passed from one to the other by the action of the sprockets.

Duplicate cassettes can easily be soldered up from thin brass sheet or foil.

Twelve exposure lengths are normally used in Agfa cassettes though longer films may be inserted with increasing difficulty. I find 12 exposures at a time ample, and suspect that the

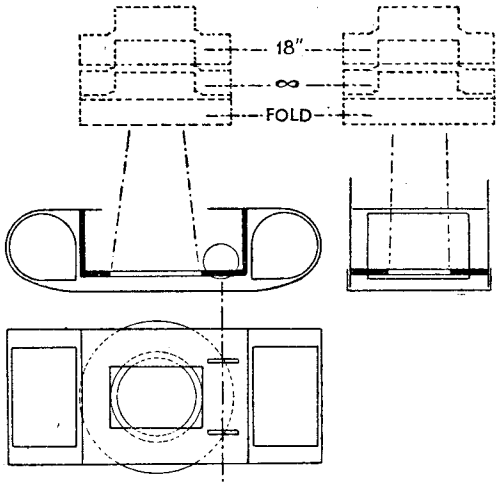


Fig. 1. Arrangement of parts

ends of 36-exposure lengths may sometimes be partially wasted in order to get on and develop some interesting frames earlier on !

The basic arrangement of the body decided I continued with the focussing assembly. Doubtless lathe owners would part off a helical mount before one could say Fox Talbot, but I had to be content with the arrangement shown in Fig. 3.

Theoretically, the lower arm of the lens panel should be provided with another rack and pinion, but in practice the design shown works well and there is no sign of " springing " as the focus is adjusted.

It is, of course, essential for the sliding member to be of stout material and to fit the body really well.

Construction

Figs. 4 and 5 show most of the details of construction, and the various panels were fabri-

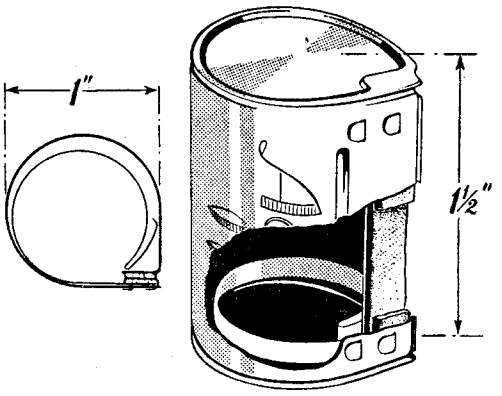


Fig. 2. Agfa cassette

cated by soft-soldering from 18- and 20-gauge brass sheet, with 3/32 in. square brass stiffening the corners and junctions.

The lens panel (shaded in Fig. 3) was actually made first, from 3/32-in. brass, and after bending, and filing true on the working surfaces, was carefully measured to determine the exact body height.

The " backbone " of the body is plate *A* (Fig. 5) the back of which was ground true on a glass plate since it forms the focal plane of the camera. For rigidity the thickness of this component was increased to $\frac{1}{8}$ in. The strips *B* were pinned and screwed to the rear plate and were set 35 mm. + 5/1000 in. apart to guide the edges of the film. Soldered into position, the two bushes *C* are tapped to take the back retaining screws (which once graced a loose-leaf ledger) and the bushes also serve to position the right-hand cassette which rests against the velvet pad shown in Fig. 5.

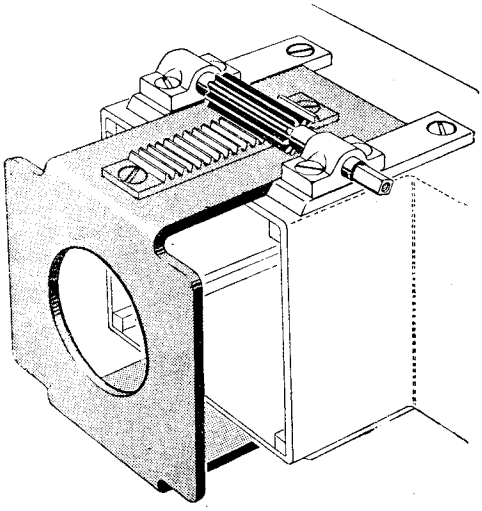


Fig. 3. Focussing mechanism

The left cassette was retained in a similar way but rests at the bottom on the tripod bush (from an old plate camera) a curved spring holding it at the top.

I riveted and sweated into place the two lugs for a neck-strap, and similarly fitted the tapered holder for the flexible release.

The two clips *D* retain the film against the and below. The lower bush is blind but the shaft projects through the top one and is fitted with the male half of a simple coupling above the camera top plate.

The central part of the shaft, between the sprockets was wrapped with a spiral spring to form a unidirectional device preventing reverse winding.

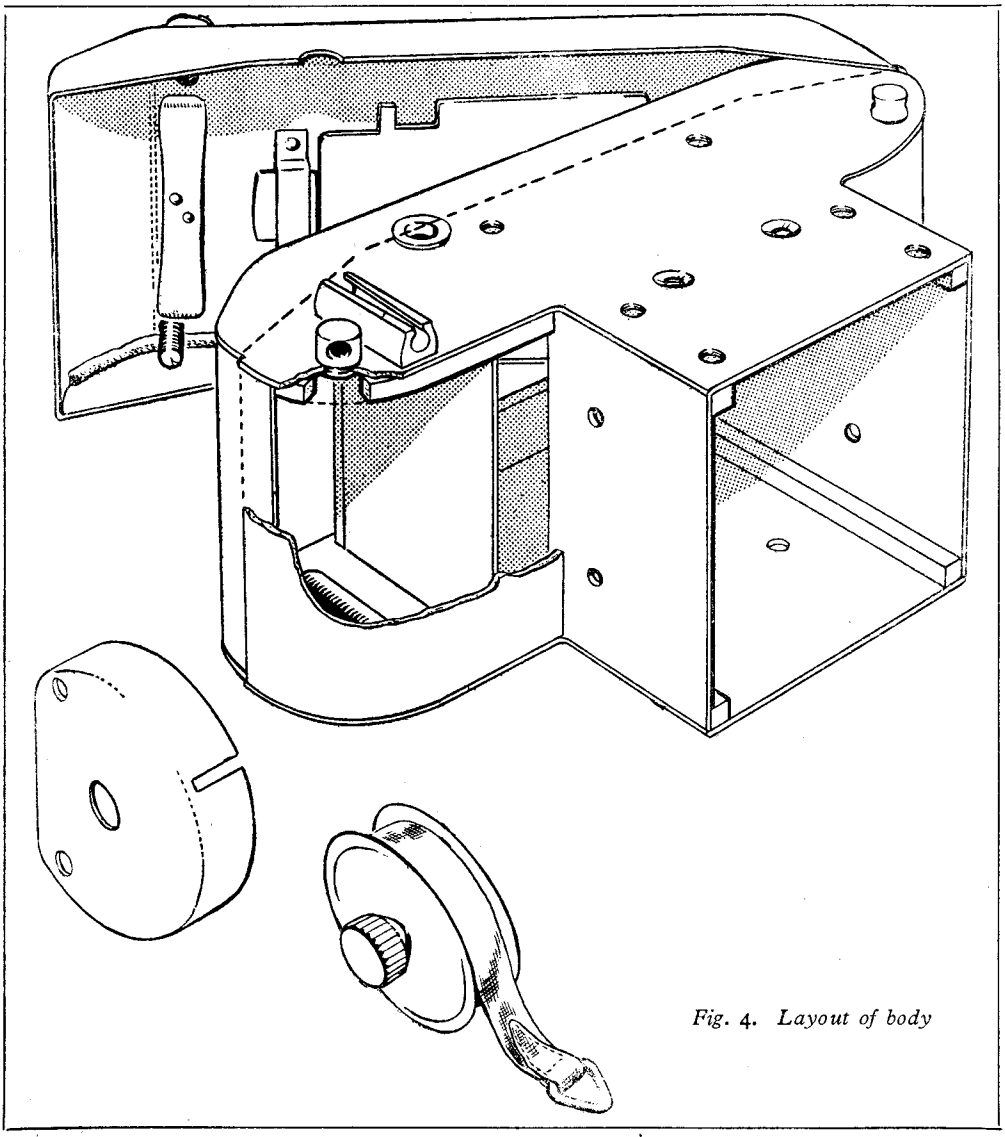


Fig. 4. Layout of body

focal plane and the sprocket teeth after loading and while the back is being closed.

The sprocket wheels have six teeth each and were filed up from $\frac{1}{8}$ in. brass using scrap film as a guide. Soldered to collars they were mounted on a $\frac{3}{16}$ in. silver-steel shaft carried in bushes above

The camera back, bent from one sheet of 20-gauge brass, was silver-soldered at the corners and fixed to the body by a short light section of piano type hinge. Two riveted springs near the ends were used to retain the cassettes tightly in position against their velvet pads.

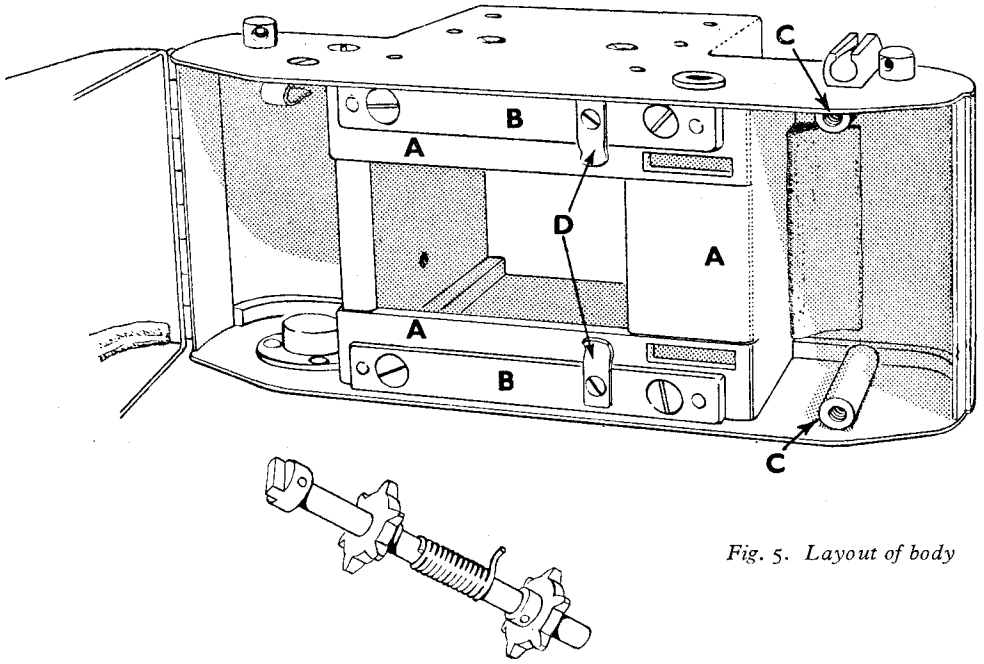


Fig. 5. Layout of body

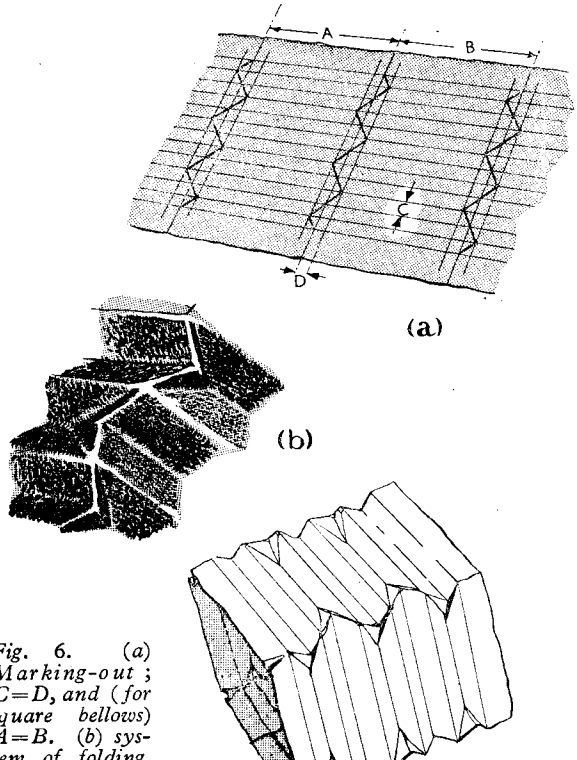


Fig. 6. (a) Marking-out; C=D, and (for square bellows) A=B. (b) system of folding. (c) finished appearance

The pressure plate was cut from 18-gauge brass and accurately ground flat after being riveted to a piece of clock spring. The latter was riveted to the back at one end and free to slide beneath a bridge piece (Fig. 4) at the other. The cut-outs seen in the pressure plate are to clear the sprocket wheels and film clips.

It will be seen in Fig. 4 that the back overlaps the body by about $\frac{1}{4}$ in. on all sides and a further light-seal was effected by a strip of velvet glued in the corners of the back as shown.

The focussing rack and pinion were salvaged from an old field camera and cut to size, and the arms of the lens panel are guided at their edges by two strips top and bottom of $\frac{1}{8}$ in. brass pinned and screwed to the body. The bottom pair of strips were bridged by a 16-gauge plate to conceal and protect the lower arm of the lens panel.

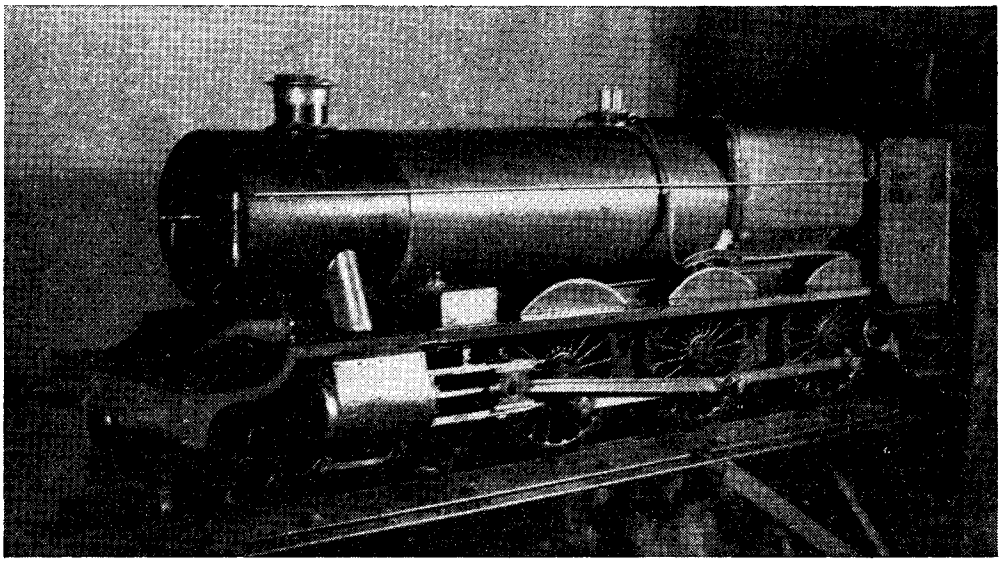
The light-tight junction between lens panel and body was made by bellows. These were folded from the cloth-based imitation leather which once covered a box camera. I intended this to be a temporary measure until I could get some real bellows leather, but they never pinholed and are still in excellent condition after much use.

As the folding of bellows seems to present difficulties to some constructors I illustrate one of the various methods (which I used) in Fig. 6.

(*To be continued*)

"L.B.S.C." Looks Backward

AS this is a special Exhibition number, "He-who-must-be-obeyed," otherwise our worthy friend the Knight of the Blue Pencil, reckons that it wouldn't be a bad idea if your humble servant set down a few reminiscences of bygone exhibitions. Anything to oblige, with pleasure; so here goes. I started attending the exhibitions, just as an ordinary visitor, soon after they commenced. That was a long time before the "Live Steam Notes" were ever the turn of the year. The old L.B. & S.C. Railway "Atlantic" (she hadn't collected the name of *Ayesha* then) showed what could be done on 2½-in. gauge. The start of the Live Steam notes inaugurated an entirely new phase of locomotive building; whereas before, most builders were satisfied if their engines would run with a light train over a "scenic" road, now they weren't satisfied unless they could sit behind on a flat car, operate regulator and reverser, shovel in



A 7¼-in. gauge "Hall" built by P. J. Rowe

dreamed of; and in those days, a 2½-in. gauge locomotive which could run continuously, with a couple of coaches or wagons, or even "light engine" with no train at all, was thought to be very wonderful. If a 3½-in. gauge engine could struggle along with a single passenger, it was considered to be the next best thing to a miracle. The first series of exhibitions came to a stop when a gentleman who rejoiced in the nickname of Kaiser Bill, got hold of the idea that he could conquer the world, and started in on the job; they were resumed when the before-mentioned K.B. found that he couldn't manage it after all, and that it would have paid him better, and saved a lot of misery, if he had gone in for locomotive-building!

It was during what we might call the second series of exhibitions, that I came into the picture. After the "Battle of the Boilers" was over, and I had proved all my contentions on the S.M.E. track at the Caxton Hall, I was invited to run my engine on the passenger-carrying track at the Exhibitions, at that time held around the coal, and generally do the doings, same as on 4 ft. 8½ in. gauge. That was all to the good. I built several more engines, and ran them in public, but soon tired of it. I never cared much for publicity. Any engineman will tell you, that he is more or less a stranger in the multitude, as the saying goes; maybe several hundred people will alight from his train on arrival at the terminal station—especially at City stations during rush hours, and at seaside stations during holiday periods—and they all go hurrying past without a pause, and usually without a look. Also—there is no harm in telling the absolute truth—there was a little jealousy among two or three of the old stagers who had hitherto held all the limelight. It was only to be expected; human nature cannot be changed, and so I discreetly withdrew. The last exhibition that I attended, merely as a visitor, was back in 1935, and I shall never attend another; I mention that fact because many correspondents want to make a date with me at the Hall, and want to see my locomotives there. Some hopes!

Early Recollections

In those earlier shows which now seem so far behind, there was much of interest to the locomotive enthusiast, and some fine examples of craftsmanship were shown. Unfortunately, I cannot now recall the names of the exhibitors, but I recollect especially a fine Caledonian 4-4-0 tender engine of the *Dunalastair* type. She was externally correct, but alas! in her firebox, instead of a grate, was a Primus oil burner with pinched-in flame cup, and there was a paraffin tank in the coal space in the tender. The cylinders were very small in the bore, as she was built to the design given in an early issue of this journal, when "half-inch-bore-for-half-inch-scale," and *pro rata*, was deemed the ideal in cylinder ratios. As the engine I am referring to, was 3½-in. gauge, I presume her cylinders were ¾ in. bore. This will cause amusement to those good folk who have built the North Eastern 4-4-0 with "scale" cylinders, which I described some years ago. Incidentally, just before the Hitler war, I rebuilt one of these Caledonian engines for an old friend, bored the cylinders as big as the castings would allow, and fitted a coal-fired boiler to her. The engine was a great success, and is still running.

There was also an *Atbara* type G.W.R. engine of same gauge. She was a fine job, too, but was also oil-fired. A saving grace on both engines, was that they had proper locomotive-type boilers; but there were no superheaters. In those days, Mr. Fred Smithies had not long brought out his water-tube boiler, the well-known plain barrel with water-tubes in the underside, enclosed in a casing of "regulation" pattern. Much ado was made, because the actual boiler containing the water, was entirely surrounded by the hot gases from the spirit burners, and therefore the boiler was considered a marvel of efficiency. Actually, it was just the reverse; because the non-productive, or "waste" heating surface—that is, the area of the outer casing—was much greater than that of the part which contained the water! This "efficiency" was one of the arguments I refuted in the before-mentioned "Battle of the Boilers," which, by the way, was the cleanest "scrap" ever conducted in the correspondence columns of this journal. Everybody went hammer-and-tongs at the argument itself, keeping strictly to the points raised; and we didn't hear anything about the "puerile mentality of Mr. Whoisit," or any other innuendoes of a similar kind. The blue pencil operator of those days (the late Mr. Walter Runciman) and our late lamented chief, Mr. Percival Marshall, both commented on this in the Editorial columns. Personally, I thoroughly enjoyed it; and ample proof that your humble servant had the final laugh is to be found in the number of small locomotives running around today, both in public and private, with coal-fired locomotive-type boilers either built to my specifications, or else adapted from them. The water-tube boiler is relegated to the little simple spirit-fired jobs usually found on "scenic" lines, for which purpose it is eminently suitable.

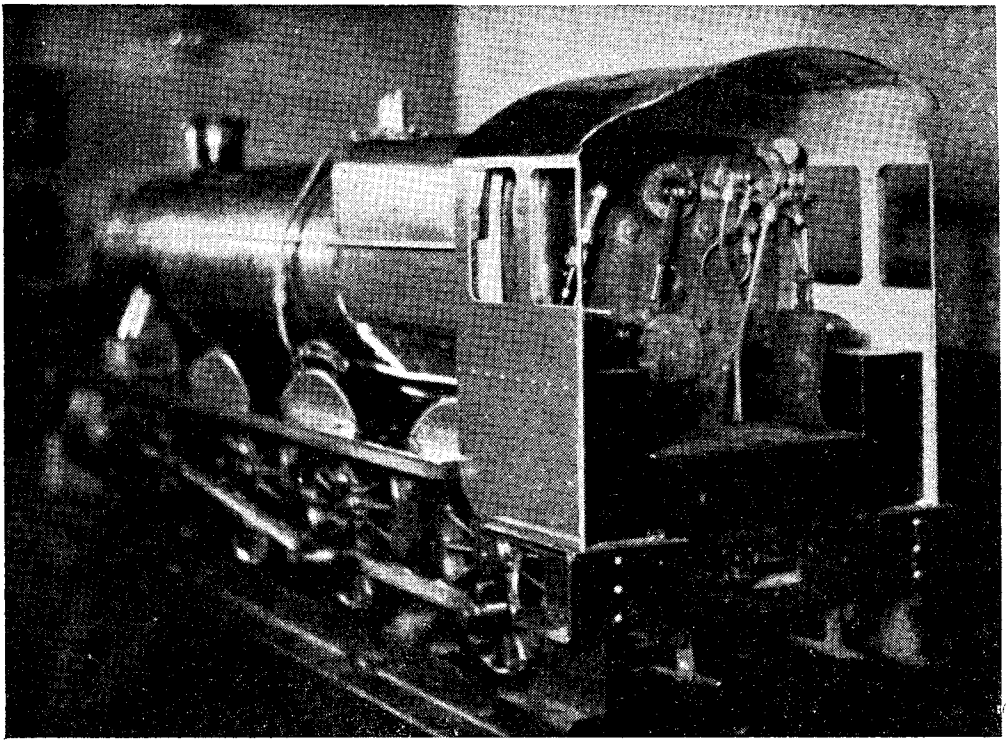
Another favourite locomotive of the early exhibitions, was the Great Northern Stirling 8 ft. single-wheeler. Many of these were built from castings supplied by Martin of East Ham, one of the pioneers of the "scale" locomotive. I still have his catalogue; the prices, compared with present-day prices for similar castings, are enough to make one faint! You could get the whole outfit for less than the price of today's cylinders. I particularly remember a magnificent example of a Stirling single-wheeler, built by two brothers, and an exact copy of the full-size job, even to the metal used in the components, and the number of tubes in the boiler. The method of construction was also the same; unlike the work of that master-craftsman, the late Dr. J. B. Winter, who cut most of his bits and pieces from solid metal, the builders used castings and sheet metal, as in full size. She was absolutely perfect in every detail; but one thing was lacking, which made all the difference in the world. It would have been useless trying to steam her, as the first few puffs, if they were of the real Great Northern vigour, would have lifted enough out of the fire to block up the tubes.

No "Brighton" Engines!

I searched in vain for a small edition of a L.B. & S.C. Railway locomotive, and was unlucky; but on one occasion I found one which came very near to it. This was a 3½-in. gauge 0-6-0 tender engine, of very similar appearance to our old "C" class Jumbos and Kitsons; but she had Joy valve gear instead of link motion, and a pair of Ramsbottom safety-valves over the firebox, instead of spring balances with the valves on top of the dome. Incidentally, goods engines were few and far between, in those early days; it seemed as though the coupling of four wheels, was as much as any builder wanted to tackle. Around the turn of the century, the inside-cylinder 4-4-0 was practically "standard" on most railways, but there were a few with outside cylinders, notably the Adams 4-4-0's on the L.S.W.R., and these engines were copied in the small size, examples being shown at the exhibitions. Tank engines were not favoured either, except for the Tilbury ten-wheelers. Martin supplied castings for these, which may have accounted for the milk in the coconut. When the prospective builder of a locomotive had the alternative of making patterns for all the castings required for his particular pet, and getting some foundry to do the job, or purchasing a set of castings and material for a "standard" type of engine, he usually chose the easier way. Speaking from my own experiences of pattern-making, I didn't blame him! In my own work, I have always tried to cut pattern-making to a minimum. Being a very poor wood-worker, most of my patterns have been made of metal, soldered together; but I always received very clean castings from them.

Trade Stands

In early days, as now, the stands occupied by vendors of castings and materials and tools and equipment, were a source of great interest. Some of the earlier exhibitors are still with us; others have departed hence, and have either ceased business altogether, or diverted their energies into other channels. The two which I regret most are Drummond Bros. and Carson's. The Drummond lathes were unquestionably the



Cab view of Mr. Rowe's "Hall"

finest value for money ever offered ; a complete screw-cutting lathe for £13 10s. 0d. with stand and treadle complete—the ubiquitous electric motor was not then found in many home workshops ; power, when available, was usually provided by a small gas engine—and the round-bed bench lathe, for £5 0s. 0d. only, are items which will make prospective purchasers of lathes at present-day prices sigh for the really good old days. I had one of every kind ; as the later ones appeared, with small improvements over their predecessors, I sold my existing machine at very little loss, and bought "the very latest," up to 1923, when the type R Milnes appeared on the market. This was a bigger and heavier machine, so at long last I broke my Drummond sequence and bought a Milnes, which I still have. However, I didn't desert Drummond's, because I still have one of their 3½-in. type B lathes, and one of their shapers. I wouldn't exchange the Drummond 3½ in. for any modern machine ; it is a perfect "intermediate" between the heavy Milnes and the light precision Boley, which have their special uses.

A stand which was always outstanding, if you'll forgive an unintentional pun, was that of Buck & Ryan ; and a contemplation of their display of tools and accessories, was certainly calculated to buck up any proprietor of a home workshop, whether he built locomotives, or used it for any other purpose !

It was Carson's who not only "set the fashion," in a manner of speaking, in the commercial world of small locomotives, but put the cat among the pigeons as well, by the extraordinary cheap rates at which they sold their excellent goods. The excuse that "people must expect to pay for their hobby" was well and truly scorned. Their most revolutionary introduction was a series of 2½-in. gauge locomotives, with paraffin burners instead of the usual "poison-gas plant," as the methylated spirit lamps were appropriately nicknamed. Every one was guaranteed to pull a minimum load of 50 lb. continuously ; and the prices varied from—hold your breath !—£12 0s. 0d. for a L.N.W.R. 4-4-0 of *Precursor* type, to £15 0s. 0d. for the G.W.R. *Great Bear* 4-6-2. This latter engine was the subject of a remarkable bit of enterprise on Jim Carson's part, for the firm produced their small edition *before big sister left Swindon Works* ! At the 1909 Exhibition, Carson's had on their stand, the finest commercially-made small *working* locomotive I have ever seen. This was a 3½-in. gauge *Great Bear*, a perfect replica of the full-sized job, even to the number of bolts and rivets. All the fittings on the backhead were faithfully reproduced to correct size and shape. When I asked old Jim Carson, at the stand, how on earth he managed to make such small fittings operate, he just laughed and said "We don't reckon to do the impossible, like our competitors ! The fittings are dummy, attached to a false back ;

they are just for show. To run the engine, the whole lot is lifted off; underneath it, on the real boiler back, are the working fittings." The engine was awarded the Silver Cup and medal, as "top scorer."

On another occasion, Carson's had a "one-inch-scale" L. & N.W.R. *Precursor* running on rollers. She was a fine job, coal-fired, and fitted with a Worthington-type donkey pump for boiler feed; also a whistle with the correct Nor'-West note. By the way, it was Carson's who made the 3½-in. gauge Mallet compound 2-8-8-2, which later came into the possession of the late Mr. J. C. Crebbin. It is illustrated and described in their 1911 catalogue which I have here at the present moment, and was priced at £160 0s. 0d. Their prices for castings and materials, were on a par with those mentioned above; 2½-in. gauge bogie wheel castings were a penny each, tender wheel castings twopence each, and coupled wheel castings threepence each. A *finished* set of cylinders, for an inside-cylinder engine of 2½-in. gauge, cost twelve shillings and sixpence; and a pair of outside cylinders, same gauge, could be had complete for fifteen shillings. I have written the sums mentioned, in case the printers think I have made a mistake in the figures! A set of cylinders finished complete, suitable for the 5-in. *Maid of Kent* which I described some little time ago, would have cost only fifty shillings, all ready to put in the frames. Kind of makes your mouth water, doesn't it?

Other firms whose stands I visited, have long since been forgotten. Wright, Clark & Wallis, of Southwark; Butcher's of Watford, and Baldwin & Wills, are names which bring no memories to our younger readers. Bassett-Lowke and Stuart Turner are, of course, still with us and going strong.

After Kaiser Bill

It was soon after the first world war ended, that a kind of boom started in the world of little locomotives, and new firms sprang up to cater for the needs of those who wished to build them. For example, there were Jackson-Rigby of Shalford, and Jubb's of Sheffield. I knew Steadman Jackson very well, and occasionally visited his small works at the Surrey village. He was an engineer, and a skilled workman, especially clever at fine work, having served his time as a toolmaker. J.-R., as the firm was known after it was turned into a limited company, had a good show at the first post-war exhibition, as they were primarily machine-tool makers, and marketed a small lathe of Steadman Jackson's own pet design. Locomotive and other castings came later, and for a brief period all went as merrily as marriage bells. However, there was a "rift in the lute"; Jackson himself left the business, and like the Roman Empire, it declined and fell. Their locomotive castings were good; I used a few of them in my own 2½-in. gauge engines.

Jubb's were one big scream. They opened up with a terrific splash, as though they intended to wipe all competitors off the map, and appointed agents everywhere. Their big idea was to supply "standard" castings and parts that could be used for building practically every type of locomotive under the sun; this was O.K. as far as it went, but now that the firm has long since departed hence, and truth is no libel, there is no harm in saying that the way they carried out their intentions, proved the cause of their own downfall. They advertised castings in best hard gunmetal. I bought a set of cylinder castings from one of their agents soon after (this was when I was unknown; the "Battle of the Boilers" had not yet been fought) and found them to be soft spongy brass. They took no notice when I complained, so I placed the matter in the hands of Mr. Alf Dawson, who was advertising manager of this journal at the time. If there was one thing more than another that roused the ire of "Bro. Alf," it was misrepresentation in advertisements; so he let fly with both barrels, with the result that I received a set of castings from Sheffield *in German silver*! I never used them, as I had meanwhile made patterns and got my cylinders cast by a clock-maker's foundryman in Clerkenwell; they *were* best gunmetal, at 1s. 3d. per lb.!

The workmanship on the finished locomotives was atrocious, among the worst I have ever seen, and soon the fur began to fly among the customers. The culminating point was reached when the firm proposed to put a cheap oscillating-cylinder locomotive on the market, and put 500 sets in hand at their works. When they came to try to assemble them, nothing fitted; the whole lot was useless, and there was very nearly a second "War of the Roses" in the office, Jubb being a Yorkshireman, and his designer and draughtsman a Lancastrian. Soon after that, the firm was liquidated, and the locomotive stuff sold off, mostly as scrap. The boilers for the oscillating engines went for sixpence each. They were originally made by one of our old reliable advertisers, who told me afterwards that he never received one penny in payment. I used one of the boilers as an air chamber to prevent "hammering" on our domestic water supply line.

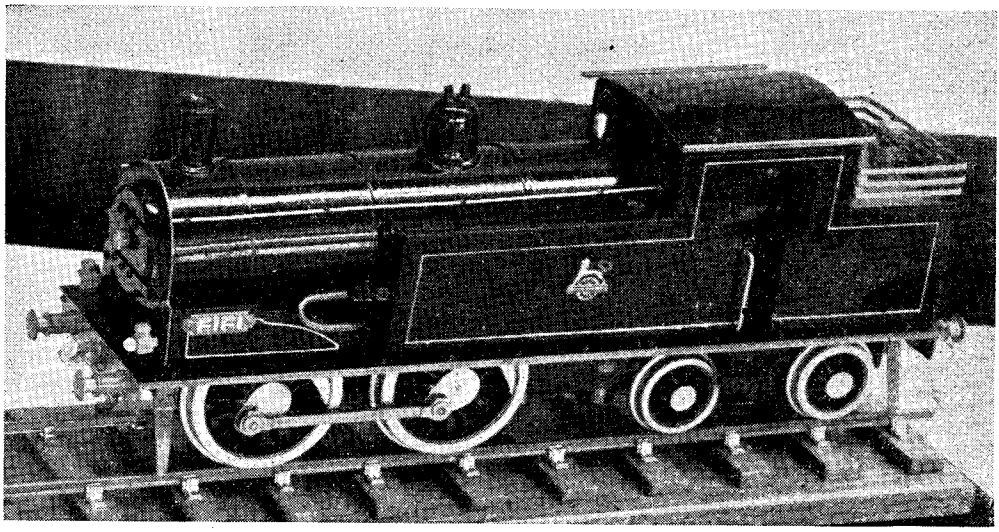
The New Era

Well, the "B-O-T-B" was fought and won; I proved all my contentions at the Caxton Hall, and the "Live Steam" notes came into being. With them came old George Kennion. He soon foresaw that there was going to be a demand for castings and parts for locomotives described in my notes, and set out to meet it, with success. He soon had to move out from his original premises in East London, and take larger and more convenient premises at Kingsland Road, close to the City area; and for many years he was the principal supplier to "L.B.S.C." locomotive builders. His stand at the exhibitions was always well patronised. After I left off running my engines on the track (rides were free in those days, otherwise I should have never run at all) I attended as an ordinary visitor; and I just loved to loiter near his stand, and hear the friendly comments passed about my notes, by visitors who did not know me personally. What happened after my final visit in 1935 I don't know. I lost sight of old George for a number of years, though I knew from corre-

spondents that he was still in business ; incidentally, his son Charles runs the independent firm of Kennion Bros., at Hertford. About 18 months ago, I had occasion to go through Kingsland Road, and as the shop was open, I called in. To my great amusement, my old friend didn't recognise me ! He had plenty of excuse, as the experiences and shocks of the Hitler war have wrought a great physical change in my make-up, even to my voice. However, I soon convinced him that I really was the " L.B.S.C." of bygone days, and I was glad to see him still carrying on with the business.

At the time I ran my engines on the exhibition track, much of the work was always done by the engines owned by the late Mr. J. C. Crebbin ; strangely enough, only last week (time of writing) I received the reproduced photographs from Mr. P. J. Rowe, the designer and builder of one of them (*Sir Felix Pole*) who has built many successful locomotives. I saw many good performances put up, but the most outstanding that I can recall was somewhere around 1927, when Mr. John Matthews's 3½-in. gauge Illinois Central Atlantic type locomotive *Charlotte* hauled a load of seventeen passengers, and received a medal for it. That load being started and hauled by a fairly small type of engine, and only four-coupled at that, should give the tractive-effort-adhesion-weight merchants quite a lot to think about. John has now retired, and lives in California ; *Charlotte* is still in existence, but she hasn't retired yet, as only the other week or so, she was showing her paces at the meet of the Golden Gate Live Steamers. Like old soldiers, old engines never die—says *Ayesha* !

A Simple Gauge "1" Steam Tank Engine



THE photograph shows a gauge " 1 " steam tank locomotive I have completed to a design published by " L.B.S.C." in his " Live Steam Notes," away back in 1934. At that time, this design was our friend's answer to a demand for a main-line type of engine for working over indoor scenic lines and requiring only the minimum of equipment for its construction. She is a copy of the Southern Region suburban tank engines, and brief particulars of the model are as follows :—

Main frames are 1⅛ in. × $\frac{1}{16}$ in. steel plate ; driving axles are sprung, and the bogie is centrally sprung. Driving wheels, 2¼ in. dia., trailing wheels 1⅛ in. dia. The single inside cylinder is $\frac{9}{16}$ in. bore × $\frac{3}{4}$ in. stroke, and the valve-gear is the slip-eccentric type arranged for early cut-off. A displacement lubricator is fitted in the left-hand side tank.

The boiler is of the water-tube type with an outer casing 2 in. dia. and inner barrel 1⅝ in. dia. Three $\frac{3}{16}$ in. dia. tubes are fitted and the whole is silver-soldered throughout. Working steam pressure is 60 lb. per sq. in.

Only the minimum boiler fittings are carried. These include safety-valve, pressure gauge, regulator, blower, and feed check-valve. Feed-water is introduced into the boiler from an external " trackside " pump. Fuel used is methylated spirit which is carried in the bunker, and fuel is fed to a two-wick burner on the well-known " chicken-feed " system.

Under steam trials this little locomotive proved very successful.

She is painted black and edged in red. Buffer beams and coal rails are red, and the tanks are lined with a single white line. The monograms are commercial transfers.

The photograph does not fully portray the pleasing lines of this simple " L.B.S.C." design, and in these days of high prices, and continuing scarcity of materials, I am sure many of us would welcome more of these gauge " 1 " jobs to the designs of our friend.—WILLIAM ALLEN.

A Chiming Gear
for the Battery-Driven Electric Clock
by C. R. Jones

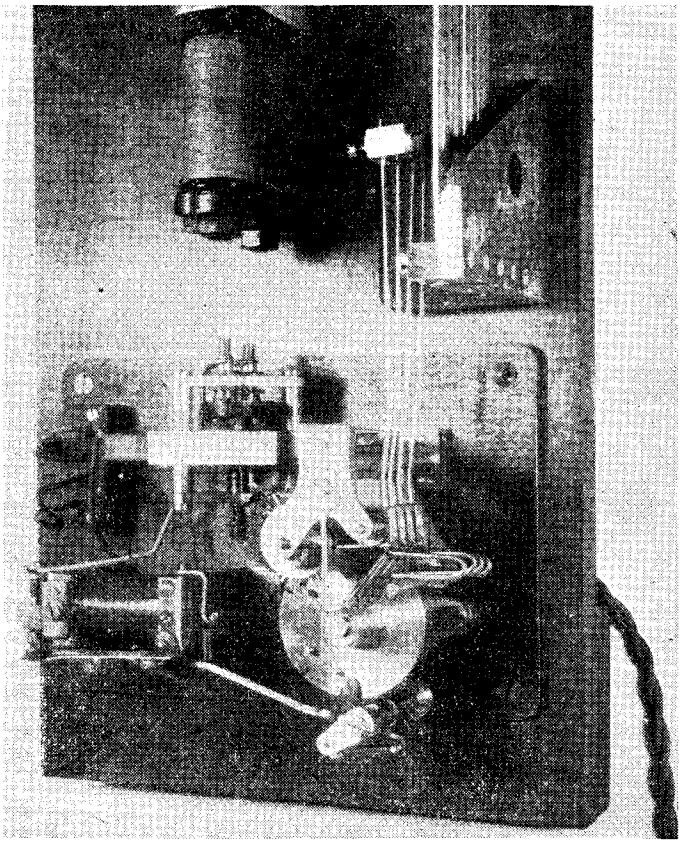
AT the time of writing the article on "A Battery-driven Electric Clock," published in the January 26th, February 2nd, 9th, 16th and 23rd, July 26th, 1950 issues, I had no intention of making a chiming gear for it, but among the letters I received from interested readers, there were several asking for particulars of a suitable one, so I decided to get busy and have a go at designing and making a chiming gear which could be operated by the clock, and also be battery-driven.

It was decided :—

(1) To make one which chimed the quarters only, and no provision made to strike the hours, as it was thought that at the fourth quarter quite a considerable time would be taken up by the chiming of the 16 notes of the fourth chime itself which would be still prolonged if the hours were struck afterwards, and could probably prove annoying at times, especially when one was listening to the radio.

(2) To pin the chime barrel for the Westminster chimes.

(3) To arrange for the hammers striking the notes, to be mechanically operated by the pins on the chime barrel, instead of using electro-magnetically operated hammers.



Photograph No. 1. View showing chiming gear on baseboard

(4) To use a small electric motor having a permanent magnet field as the motive power for rotating the chime drum, and operating the four hammers. So a design was got out, to use two "Eclipse" horseshoe magnets to energise the

field, the armature being a small tripolar one, having a flat disc commutator, and copper carbon brushes.

(5) To use tuned bronze rods for the chimes, instead of tubes or bells.

(6) To make the whole chiming gear small enough to be accommodated on the same width of backboard as was originally used for the clock, but 6 in. longer.

(7) To arrange matters so that the whole of the action of the chiming gear could be seen, and not hidden, as in the case of most clocks.

After considerable experiment a satisfactory chiming gear was constructed, and has been working consistently well.

This is shown mounted on a new lengthened baseboard, in the photographs No. 1 and No. 2.

It will be seen that the whole chiming gear is self-contained and is mounted in this case on a steel plate, which is screwed to the lower end of the baseboard. This plate is $6\frac{1}{2}$ in. $\times$ 5 in. $\times$ $\frac{1}{8}$ in. thick.

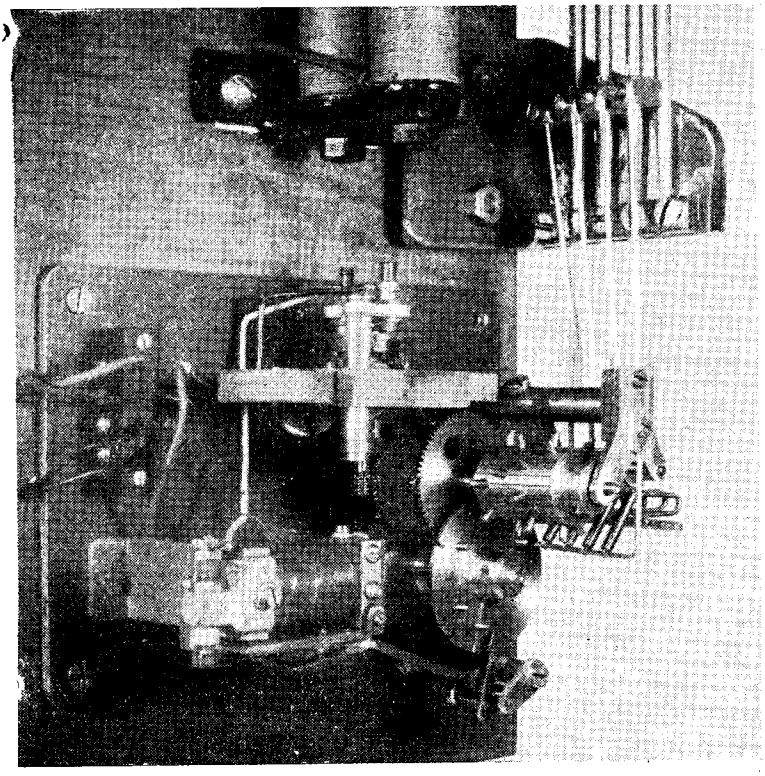
The chiming rods and their bracket, being separately affixed to the baseboard, to the right of the magnet operating the clock pendulum, there being sufficient room for the hammers to lift without their touching this magnet.

The chiming rods being kept as far as possible to the right, the swing of the pendulum does not foul these either.

Photograph No. 3 should now be studied, which is a view taken from the underside. At the top to the left is a terminal block having four terminals. At the top (centre) is the motor.

At the top (right) is the chime drum with its pins and part of the hammers showing. The worm on the motor shaft and the reduction gearing can also be seen.

At the bottom (left) can be seen the chime release magnet, with its armature carrying a pair of contacts to the left, and the control arm at the right side which engages with the slots in the control disc (right bottom).



Photograph No. 2

The chime drum carries 20 pins, consisting of five separate four-note chimes, and rotates two complete revolutions in every hour. At the first quarter four notes are struck, at the second quarter eight notes, at the third quarter twelve, and at the fourth quarter, sixteen notes.

Geared to the chime drum is the control disc which rotates at half speed, and, therefore, does one complete revolution while the chime drum is doing two.

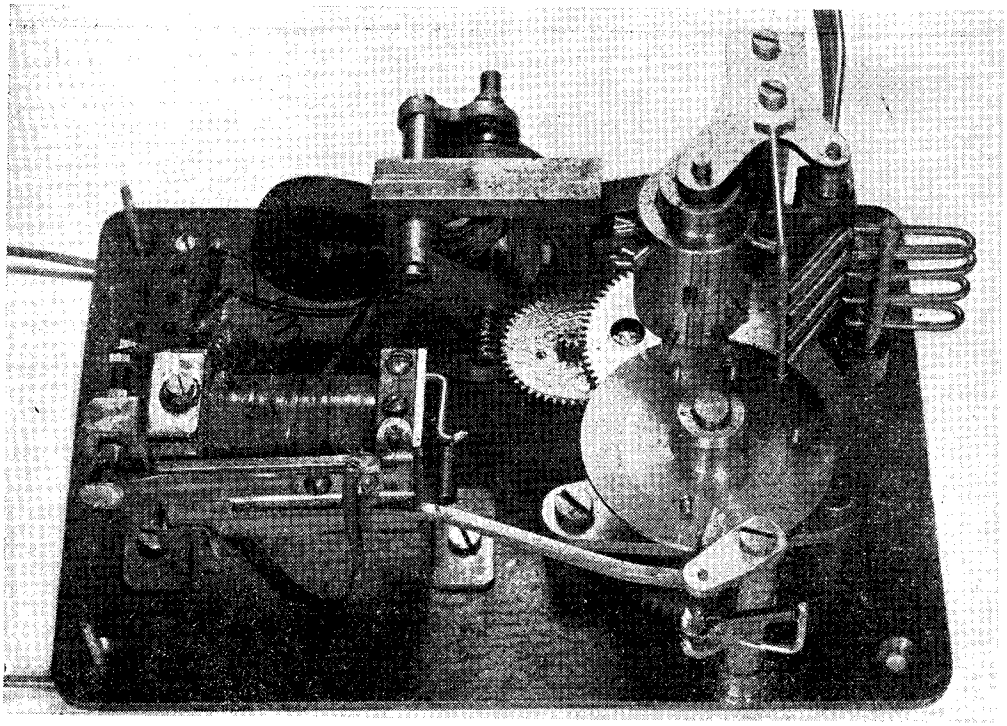
At this stage it would be as well to explain how the chimes work. Fixed to the centre spindle of the clock is an arrangement which makes a very short contact exactly at each quarter hour.

I am purposely leaving the arrangement fitted to the clock itself until the last part of this article,

so that readers will have time to think about it themselves. What will be required is something that makes a positive contact at every quarter of an hour, and of only a short duration, as the first quarter chime only takes about four seconds to play, and if the contact was longer than this, the chimes would continue to play the second quarter as well. To complicate matters the centre spindle

slight over-run made use of by other writers on chiming gears to get over a knotty problem, i.e., the fact that when the control lever was lifted out of the slot in the control disc, it immediately dropped back again, owing to the very short duration of the contact at the clock.

This trouble was finally got over by installing a small spring retained catch at the bottom of the



Photograph No. 3. View of chiming gear looking upward

of the clock takes one hour to complete one revolution, so any form of direct contact to this would be too slow. So think it over.

The contact on my clock is in series with a battery and the winding on the chime release magnet, and thus this magnet is energised at each quarter, and so attracts the free end of its armature, closing the contacts on the left, and lifting the control arm on the right, out of the slot it happens to be in the control disc. When the contacts close, these switch the current to the motor, which starts to rotate and drives the chime drum through the reduction gears, and this state of affairs continues until the end of the control arm drops into the next slot, which stops the motor. At the next quarter the same cycle of operations takes place.

Things were not quite as simple as this though, and it was found that when the current was cut off from the motor by the opening of the contacts, the motor stopped dead, probably owing to the pull of the field magnet, the smallness of the armature, and the flat commutator, so the control disc, which holds out the end of the control lever, once it has been lifted, until the disc has rotated far enough for the end of the lever to drop on to the outer edge of disc, when the catch is knocked aside by one of the pins which can be seen sticking out of the disc.

It has been found that two volts is sufficient to work the chiming gear (both the motor and the release magnet) and so a small two-volt radio accumulator has been used to work the chimes, and this has been given a charge about once a month to keep it in condition.

I have no doubt, although I have not tried it, that two Leclanche cells would drive this chiming gear satisfactorily.

The chimes for the complete hour take about three-quarters of a minute to play, so this works out at about 18 minutes per day of 24 hours that the motor runs, and, of course, there are rest periods of 15 minutes between each chime, which would give the battery a chance to recuperate.

The chimes have worked quite satisfactorily,

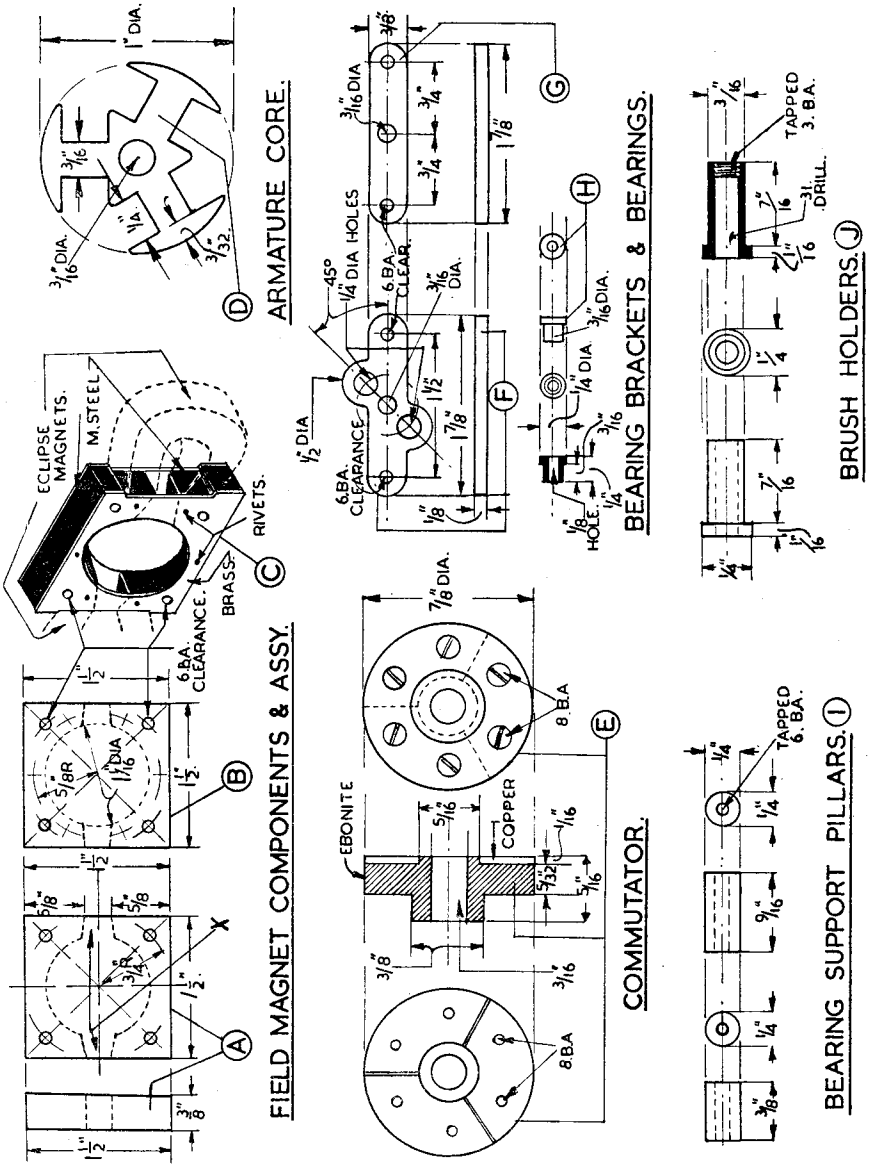
using a similar battery to that driving the clock, i.e. a three-volt cycle lamp battery, although three volts makes the chiming rather too fast, and it was necessary to insert a short length of resistance wire in circuit with the motor to slow it down a little.

It is essential once the chimes are working properly to see that the battery is *always* connected up the same way round, otherwise damage will be done.

Similar chimes could no doubt be made and used on other clocks—for instance, clocks of the grandfather type.

I make no claim to have designed a perfect chiming gear, nor do I think that the windings of the motor and the release magnet, etc., could not be improved upon, as well as numerous other details, but I hope interested readers will have enough information to enable them to make a satisfactory chiming gear, and that they will use the following information as a kicking-off point, anyway.

The motor, as before mentioned, was made to use easily obtained magnets for the field, but no doubt many readers will have, or be able to obtain, small permanent magnets, specially made for



small motors, or possibly complete motors which could be used or converted for use, for driving the chimes.

As many readers may like to construct the motor themselves, I will now describe how I made mine.

Field Magnet Components and Assembly

To make the field magnet, a piece of mild-steel was faced up in the lathe to the dimensions shown on the drawing, viz. to 1½ in. square by ⅜ in. in thickness; also, two plates of brass, 1½ in. square by 1/32 in. in thickness, were prepared. These parts were then sandwiched together as shown, and marked out for the four No. 6 B.A. clearance holes, and these holes drilled. Four No. 6 B.A. bolts were then inserted at the corners and tightened up.

The assembly was then returned to the lathe and set up true, and was then drilled and the hole for the armature to work in, was bored out to 1 1/16 in. in diameter. After removing from the lathe the bolts were removed, and the mild-steel piece was marked out and the two pieces shown on the drawing by the dotted lines sawn out and filed up (see *X*). This left a gap at each side of field magnet, of about a ¼ in. at the outside and about ⅜ in. on the inside.

The field magnet was then reassembled with the brass plates, and the four bolts replaced at the corners, the whole being properly lined up, the bolts being tightened, and a few 1/16-in. diameter holes drilled where shown on (*B*). 1/16 in. diameter rivets were then inserted and the whole carefully riveted up. The bolts were removed. The assembly then had two recesses filed as is shown on the sketch (*C*). These were made about 1/16 in. deep and long enough to receive the ends of the "Eclipse" magnets, which should make good contact with the steel part of the field magnet.

Armature Core

The armature core in this case was made from a piece of mild-steel 5/16 in. in thickness, which had been softened by heating and slow cooling, and was cut and filed up as shown, and after the centre hole had been drilled, was put on a true-running mandrel and the outside diameter turned up. Care was taken to remove all sharp edges on the arms and where the winding would be likely to be damaged. If stampings are available, they should be used for preference.

Commutator

This was turned up from a piece of ebonite, a copper disc was turned up to fit on the spigot as shown, and was then drilled and the disc tapped No. 8 B.A., and small countersunk screws inserted from the rear. After the three saw-cuts had been made, the commutator was put on a true-running mandrel and the copper face trued up. The saw-cuts should be made as narrow as possible.

Bearing Brackets and Bearings

The brackets were made from brass ⅛ in. thick to the dimensions shown. It will be noticed that the holes to accommodate the brush holders are drilled at an angle of 45 deg. to bring the holders in a vertical line when the brackets are in the fixed position.

The bearings in this case were turned up from bronze rod and were pressed into the brackets, and the 3/16 in. diameter holes as shown on the spindle assembly drawing. 1/16 in. diameter holes were drilled in bearings for oiling purposes.

Bearing Support Pillars

These were made from ¼ in. diameter brass rod and were drilled right through and tapped at each end No. 6 B.A.

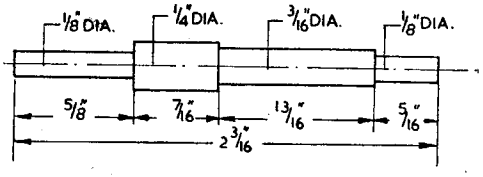
The bearing support pillars were attached to the field magnet by means of short lengths of No. 6 B.A. screwed rod, which was long enough to pass through the holes in field magnets with sufficient protruding at each side for the pillars to screw on to, and these were then firmly tightened up. The bearing brackets were attached to the pillars with No. 6 B.A. cheese-head set-screws.

Brush Holders

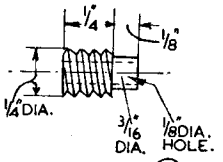
These were turned up from ¼ in. brass rod to the dimensions shown, and made to accommodate two copper carbon brushes as supplied for "Trix" trains.

Armature Spindle

This was turned from a piece of ¼ in. diameter silver-steel to the dimensions shown, the 3/16 in. diameter portion being left slightly oversize so that the armature core could be pressed on tightly and also that the commutator would fit tightly on the spindle.



ARMATURE SPINDLE. (K)



WORM. (L)

Worm

In this case the worm was made to the dimensions shown and was screwcut with a right-hand thread, 18 threads to the inch.

(To be continued)

IN THE WORKSHOP

by "Duplex"

96—An Automatic Switch for the Air Compressor

SOME time ago we promised to describe an automatic switch for controlling the air compressor referred to in an article entitled "Compressed Air Supply for the Workshop" and published on May 18th, 1950.

This switch has been the subject of a good deal of experiment; indeed, several different types of switches were made and tried before the switch, here described, was finally developed. The switch finally adopted was the Burgess Micro-switch that has a travel of only some three thousandths of an inch between the "on" and the "off" positions; moreover, the pressure on the contact pin needed to operate the switch is approximately 1 lb. Nevertheless, this small movement of the contact pin is sufficient to cause a wide break between the contacts fitted within the body of the switch.

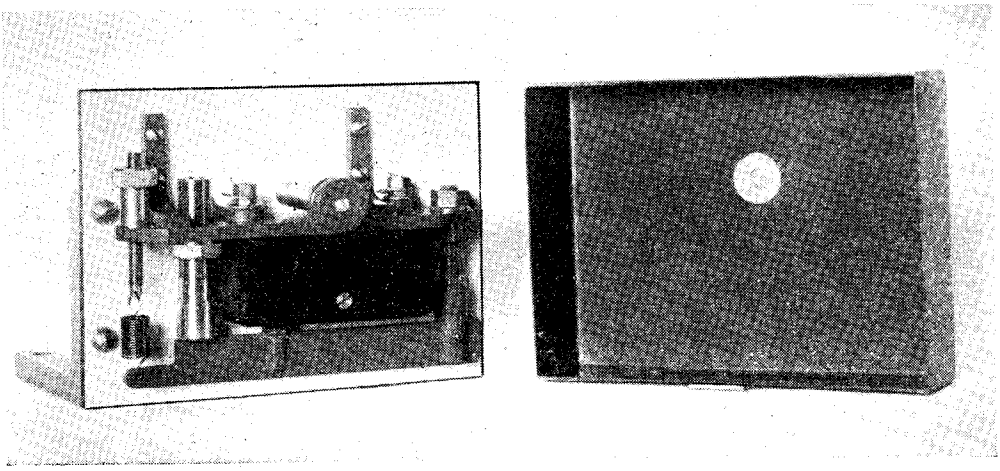


Fig. 1. The automatic switch with its cover

The principle involved employs a piston, acted on by the air pressure in the reservoir, to operate an electrical switch wired in the circuit of the driving motor. As the air pressure increases, the piston rises in its cylinder and lifts a lever.

This lever is pivoted at one end and is fitted with a pad to make contact with the operating pin of the switch, so that when the lever has moved for a set distance the switch opens and the motor is stopped. Initial experiments were made with mechanisms having an operating piston with a long travel, and although these worked quite well, it was, however, found that this type of switch was not sufficiently sensitive, for the range of pressure between cutting-in and cutting-out the motor amounted to some 35 lb. per sq. in. This meant that, if the switch had been set to stop the motor at 80 lb. per sq. in., the motor would not be started again automatically until the pressure in the air receiver had fallen to about 45 lb. per sq. in.

To reduce this pressure range, it was decided to use a switch with a much smaller working movement as this would also reduce the length of the piston travel.

A useful feature of the Burgess switch is that, by altering the connections to the marked terminals, the switch when at rest either makes or breaks the electrical circuit.

When using this type of switch with a compressor, the electrical connections should be made to the terminals marked "Normally Open," for the switch is held in the closed position until the air in the container reaches the required working pressure.

The complete switch gear, illustrated in Fig. 2, consists of a baseboard to which a bar *B* is attached by means of two angle-steel brackets *C*. On the bar are mounted the fulcrum assembly *D* carrying the operating lever *E*, the operating cylinder *F* with its piston, the adjustment thimble *H*, for the return spring, and, in the centre, the Burgess switch.

The switch itself is secured to the bar by means of two 6-B.A. studs that also serve for making the wiring connections, but these metal studs must, of course, be kept clear of the bar by fitting bushes made of insulating material.

With regard to making the component parts

illustrated in the working drawings, little need to be said about their construction, but a short description of the baseboard with its cover, as well as the operating cylinder and piston, may be found helpful.

The baseboard was made of plastic material as this was easy to drill and also served to insulate the wiring connections entered from the back of the panel. Should sheet metal be used for making the panel, insulating bushes will have to be fitted to carry the leads. Two angle-iron brackets, fastened to the back of the board, are used to mount the switch unit in place, but these brackets are not required if room can be found to screw the insulated panel directly to the frame of the compressor.

It is advisable to keep the switch covered, and the simplest form of cover is, perhaps, made from tinplate as shown in the illustrations. A stud fitted with a knurled finger nut is screwed into the panel and serves to hold the cover in place.

After the tinplate has been marked-out in accordance with the accompanying drawing, the material is cut to shape and then carefully hammered down on a wooden former, so that the joints can be made either by soldering or riveting. To save the trouble of making the cover, it may be found possible to obtain a standard commercial plastic cover, such as those fitted to bell transformers. The cylinder and piston must be made of non-rusting material, for water is apt to condense from the compressed air and attack these parts; any corrosion here will interfere with the free-working of the closely-fitted piston.

If the piston is not made air-tight in the cylinder, the contents of the reservoir will, of course, slowly leak away when the compressor is idle.

Tungum bronze has been found suitable for the cylinder as this alloy has a very high resistance to corrosion, but if this material is unobtainable ordinary bronze will do. The piston is best made of stainless-steel.

In order to reduce air leakage, both the cylinder and the piston should be lapped to a close working-fit. Without using special equipment, such as a Boyer-Schultze lap, the cylinder can be lapped quite well with a piece of aluminium rod turned to a sliding fit in the bore. As shown in the drawing, the end of the rod is split with a hack-saw and a brass wedge is fitted to expand the lap and take up wear. The lap is mounted in the chuck of the drilling machine and the work is held in the hand. After the lap has been lightly coated with a fine-grit lapping compound or with Brasso metal polish, the cylinder is pushed on to the lap and the machine is started at a moderate speed. The cylinder is kept moving up and down

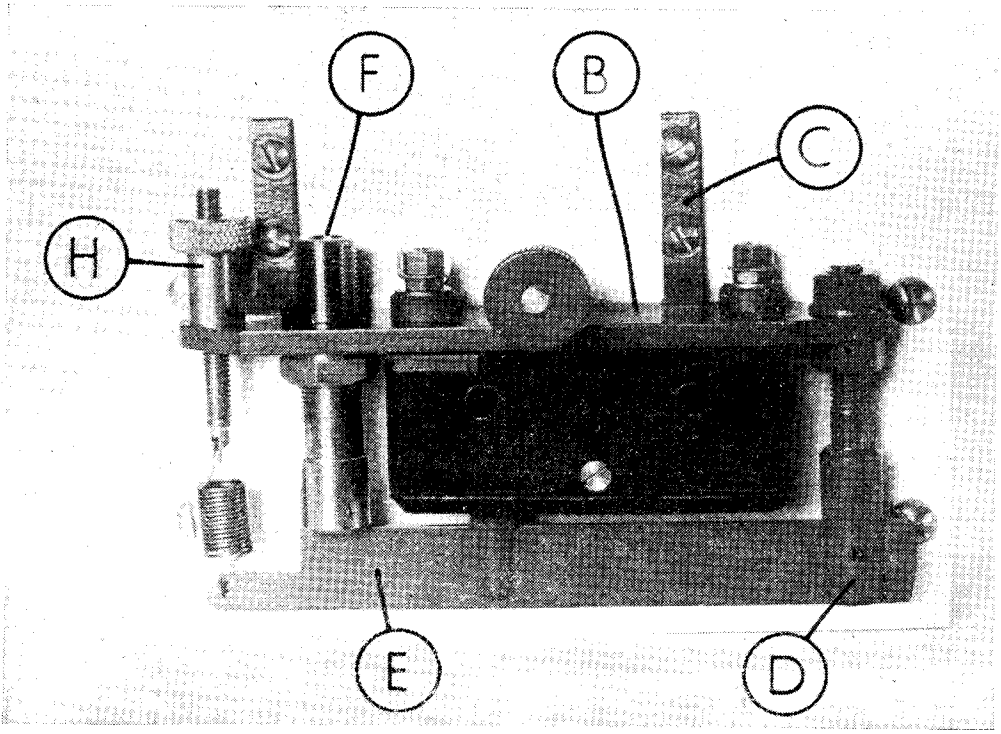


Fig. 2. Showing the constructional details. "B"—the bar; "C"—the bar attachment brackets; "D"—the lever pivot; "E"—the operating lever; "F"—the cylinder; "H"—the spring tension adjuster

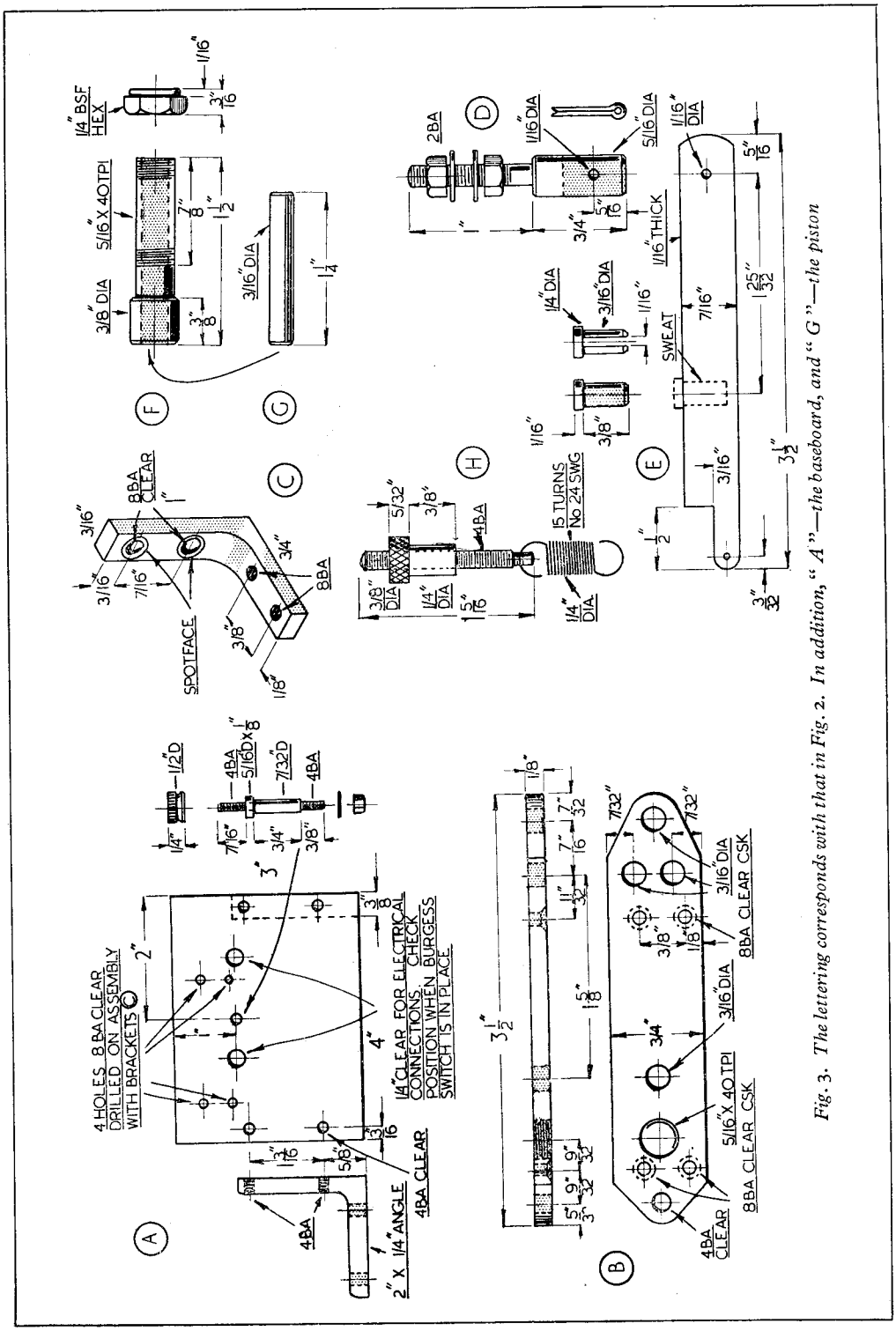


Fig. 3. The lettering corresponds with that in Fig. 2. In addition, "A"—the baseboard, and "G"—the piston

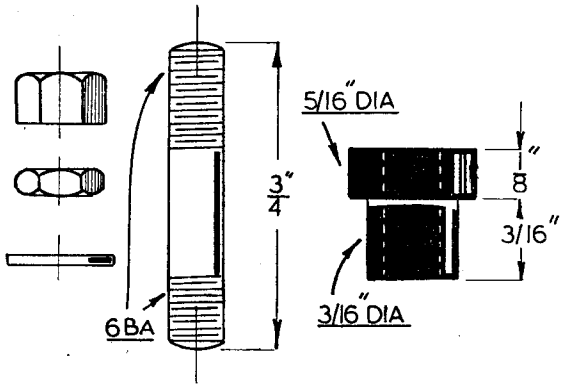


Fig. 4. The switch attachment studs and insulating bushes

fitted with special unions. As the making of these small unions was fully dealt with in an article on "Pipe Fittings," published in this journal on July 13th, 1950, no further description is needed.

The electrical connections are made so that the switch is wired in the live lead to the motor, and the switch is, of course, connected in series with the motor. In addition, it is as well to fit the motor circuit with its own fuses.

Setting the Switch

When assembling the switch, the height of the cylinder must be adjusted so that the operating lever comes to rest against the base of the cylinder immediately after the Burgess switch has cut in. To set the switch to cut out at the regular working pressure, the return spring is first well-tensioned, and, as soon as the required air pressure is recorded by the pressure gauge, the spring tension is eased to allow the switch to open and cut out the motor.

It should be noted that the safety-valve fitted in the system should be set to blow off at some 5 lb. to 10 lb. in excess of the pressure set on the automatic cut-out.

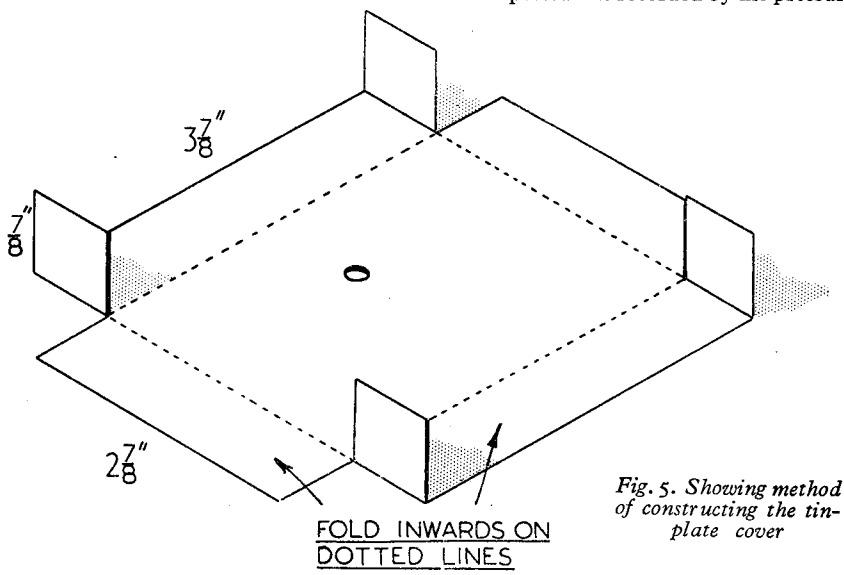


Fig. 5. Showing method of constructing the tin-plate cover

on the lap, and the work is continued until the bore shows a uniform bright surface. From time to time, both the lap and the cylinder bore should be cleaned with paraffin and fresh abrasive then applied. Lapping the piston is carried out with a ring lap ; this can be made quite easily by drilling a hole in a piece of brass or aluminium bar, and, after a slit has been cut into the drill hole, a screw is fitted to close the lap and give the necessary adjustment. Lapping is continued until the piston becomes a close—but free—sliding fit in the cylinder. Care must, however, be taken to ensure that the parts are quite clean before a trial is made, for any trace of abrasive or metal particles will give a false impression and may result in the lapping being carried too far. When finally assembling the parts, the piston should be fitted quite free from oil, as any lubricant present will be found to interfere with the sensitive working of the switch.

The switch is connected to the air receiver by means of a $\frac{1}{8}$ in. outside diameter copper pipe

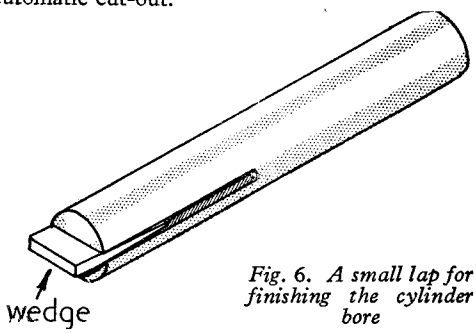
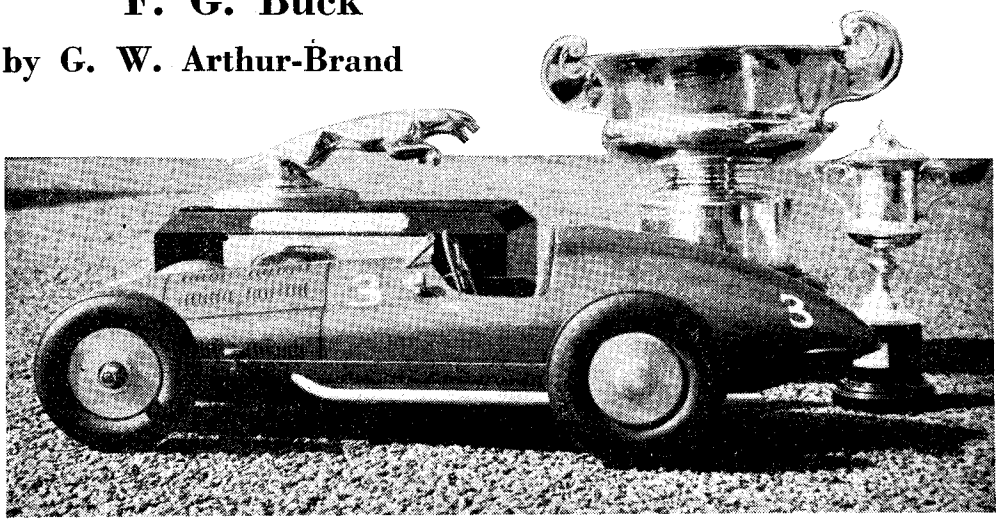


Fig. 6. A small lap for finishing the cylinder bore

Model Engineers at Work

F. G. Buck

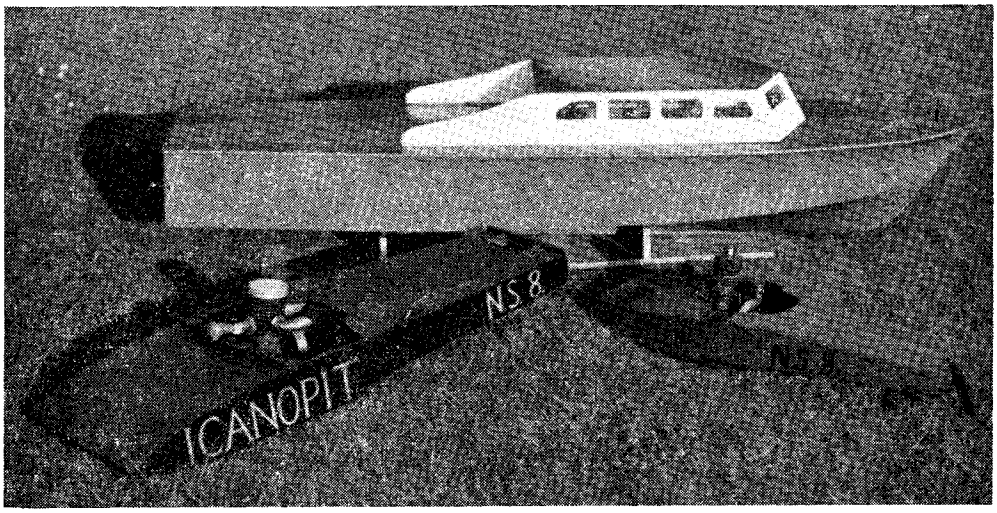
by G. W. Arthur-Brand



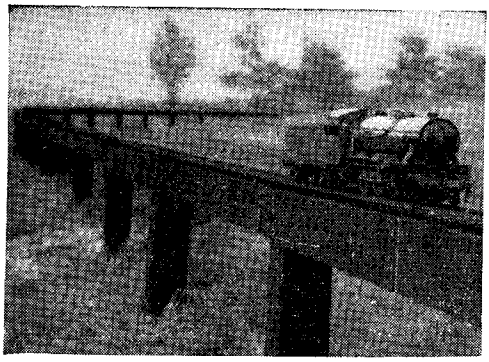
" Topsy," with some of the trophies she has won

ONE of the hallmarks of greatness is the ability to submit oneself to the criticism of one's fellow men ; another is the ability to appreciate in other men's work qualities of execution superior to one's own.

In introducing Mr. F. G. Buck to readers of " Ours," these two qualities automatically spring to mind, because they are, I think, the *raison d'etre* of his success as a model engineer. His very versatility has undoubtedly been the direct outcome of his astonishing ability to sift, sort and assimilate the tit-bits of knowledge which present themselves, often so elusively, through the media of models, articles or ordinary every-day conversation. Those readers of THE MODEL ENGINEER who know him only in connection



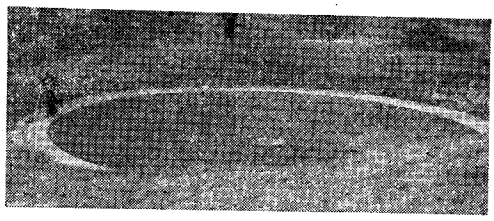
The old and the new. A modern radio-controlled launch, as yet incomplete, with a couple of hydroplanes



The garden railway, with "Fayette" in the foreground

with the building and running of model cars will, perhaps, be a little surprised to learn of his other activities, and indeed, it is for precisely these people that this article is being written. No one who has met F.G.B. and listened intelligently to his views on model engineering would doubt the fortitude of his philosophy, or deny that his unfailing wit and good humour has influenced, in no small way, his own views on the subject. Because Gerry, as he is known to his friends, is no one-track-minded bore; his interests are wide and well seasoned, and he can, and does, at any moment switch his attention from one topic to another so as to offset staleness.

Up to 1935, F.G.B.'s attention was centred around clockwork, electric and steam boats, and elastic-driven submarines. When I visited him at his charming residence in Stoke, he



Starting "Topsy" on the home circuit

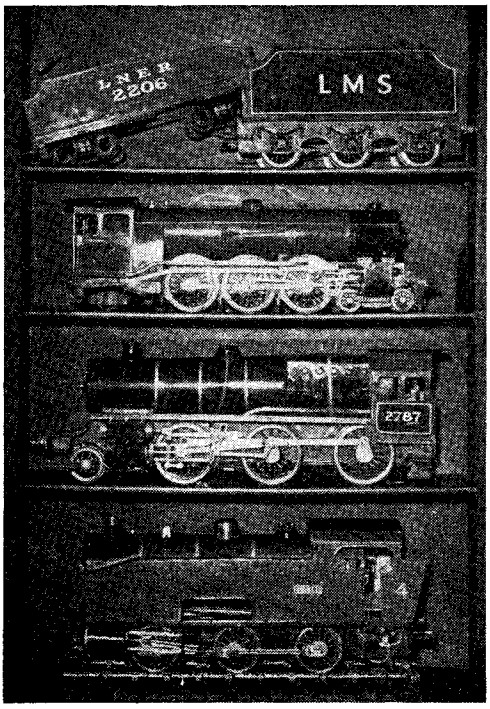
stopped the car and pointed out to me the stretch of canal on which these early models were run. It was easy to see, as he spoke, that the memory of those far-off days gave him a great deal of pleasure.

No one could be seriously interested in boats without happening upon the i.c.-engined variety, so it will be no surprise to learn that by 1936, our tyro had embarked upon this somewhat more advanced phase. His efforts resulted in 15- and 30-c.c. two-stroke hydroplanes, and a 25-c.c. o.h.v. steering boat.

New Fields

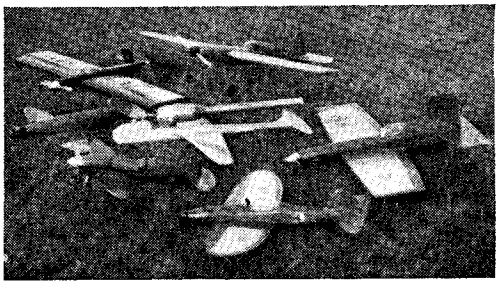
By 1937, the young Buck was again on the prowl to conquer new fields, and this time it was the model locomotive that claimed his attention. A 2½-in. gauge "Fayette" and a 3½-in. gauge "Princess Marina" followed each other quite rapidly through the home workshop to emerge, eventually, upon 250 ft. of multi-gauge garden track. That both models and track are still operative and in excellent condition is a credit to the manner in which they were built.

Phase four erupted in 1939 with the coming of the model car age, and the birth of Old No. 1 marked an important stage in the development

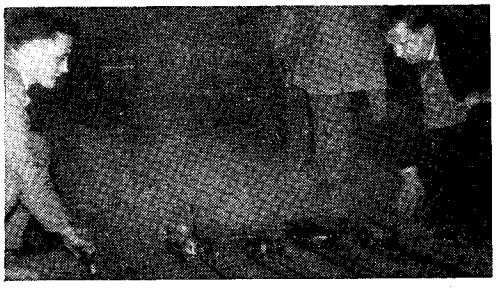


The locomotive models in their cupboard

F. G. Buck about to push off. The model—"Topsy"



A few of F.G.B.'s aircraft models

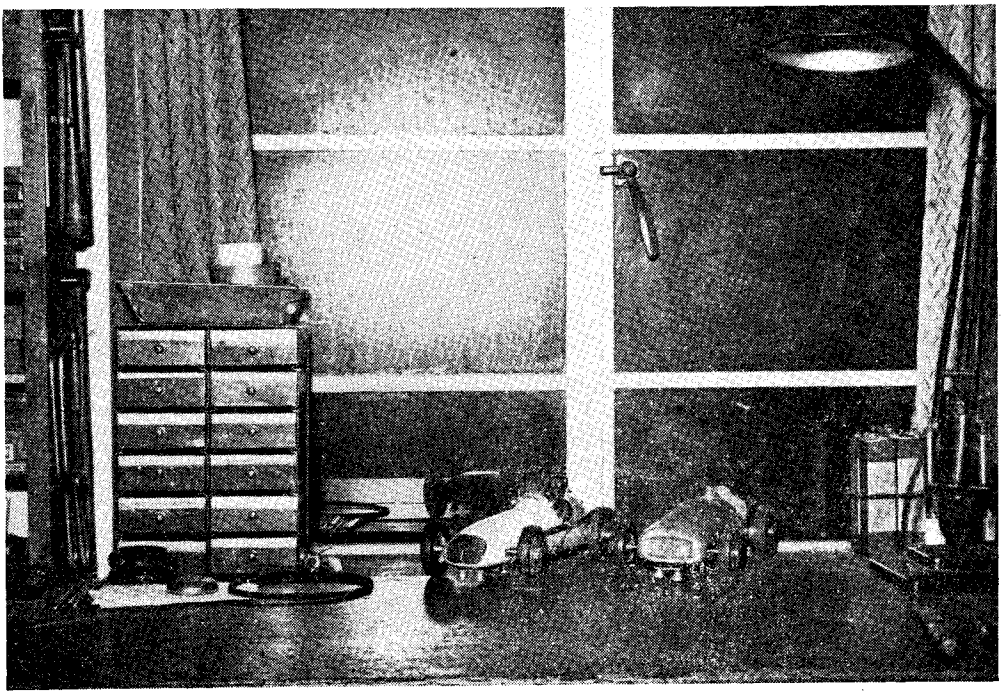


The latest phase—miniature Grand Prix racing

of the model car movement. No. 2 followed and was wrecked, then the famous " 2A " came on the scene and devastation reigned. By this time Gerry had become King of the Spindizzies, and was being quoted, copied and misquoted by everybody who claimed to be anybody in the sport of rapid gyration.

Following " 2A " came *Topsy*, the all home-made, all-British car, the first in Britain officially to record 100-plus m.p.h. Almost every trophy fell before this delightful piece of high-speed model engineering ; then the sour grapes started falling from the vines of despair, and certain " model engineers " sought foreign markets as a means of publicising their lack of sportsmanship and to cover up their shortcomings in the home workshop. Readers please note : it is a great insult to classify these latter with the many real model engineers who have done, and are still doing, fine work in car modelling ; they might be referred to as *model mechanics*, but never as *model engineers* !

F.G.B. has always been a champion of British products, as have all other members of the Meteor club of which he is a founder member. When the " two-fives " became popular and offered serious competition, he replied with " *Wee* 2," a microbic specimen powered by a commercial engine. This quaint little car proved to be just another typical example of Buck carology, and twirled its way to victory, at the same time establishing a number of records in its class, as did *Topsy* and " *2A* " before her. At the time of writing, Gerry holds no fewer



The assembly bench. *Note G.P. models, Maserati and B.R.M.*

A corner of F.G.B.'s home workshop

than fifteen M.C.A. official records, over three times as many as anyone else! Always ready to render a service to his fellow enthusiasts, he designed an electric timer which has become more or less standard equipment on a large number of British tracks.

In 1948, concurrently with phase four, control-line aircraft captured his imagination, with the result that a number of stunters and speed models took the air. Team-racers followed, also a helicopter and sundry free-flight models, powered by engines of from 1-7½ c.c.

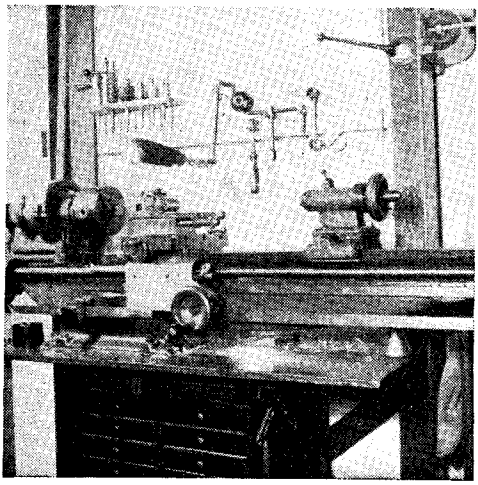
Phase six he counts as models in the course of completion, and these include more speed 'planes, a radio-controlled boat, and a radio-controlled 'plane. In addition, he is taking a very live interest in model cars again, because at last it looks as though model car racing is about to establish itself, and he has answered the call by leading members of his club to construct the first-ever model of a multi-car Grand Prix type circuit, to the patented design of Mr. Henri C. Baigent, of Bournemouth.

And of the future? "Who knows?" says Gerry, "but probably back to boats!"

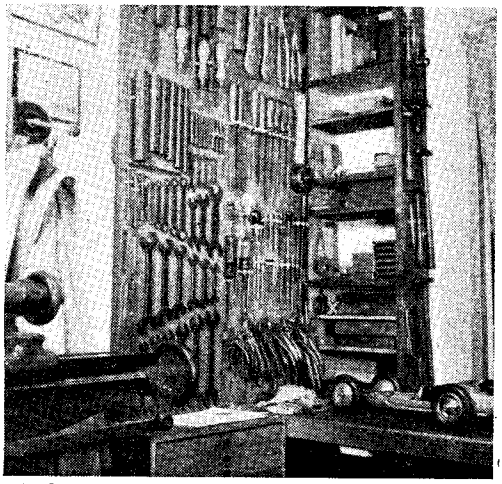
The Workshop

Every reader will undoubtedly want to know something about the workshop from which these wonderful models emanate. Many will have formed ideas of a fantastic establishment, replete with all des. mod. con.; but, in fact, nothing could be further from the truth. F.G.B.'s workshop occupies what may be termed a "box room," such as is found in most modern homes. A glance at some of the accompanying photographs will verify this; it should also give the secret of success in any small home workshop—a place for everything, and everything in its place. It will be seen, too, that the tools are no different from those which grace the homes of a great number of readers, therefore another secret springs to light—it ain't wot yer got; it's the way wot yer use it!

And now, finally, I can imagine most of you thinking, "I wonder if this character ever thinks of anything beside model engineering?" While I hesitate to diverge from the path upon which I at first set out, I think I can throw a little light upon F.G.B.'s private life, if for no other reason than to establish that he is not a slave to his hobby. Briefly, he has a very charming wife, an equally charming baby daughter, and, therefore, spends a great deal of his time administering to the social and paternal requisites of home life. This, incidentally, includes countless other little lives for whom he feels a considerable responsibility—the inmates of his tropical aquarium!



The lathe, with useful cabinet beneath



And another corner, showing how to find your implements at a glance!

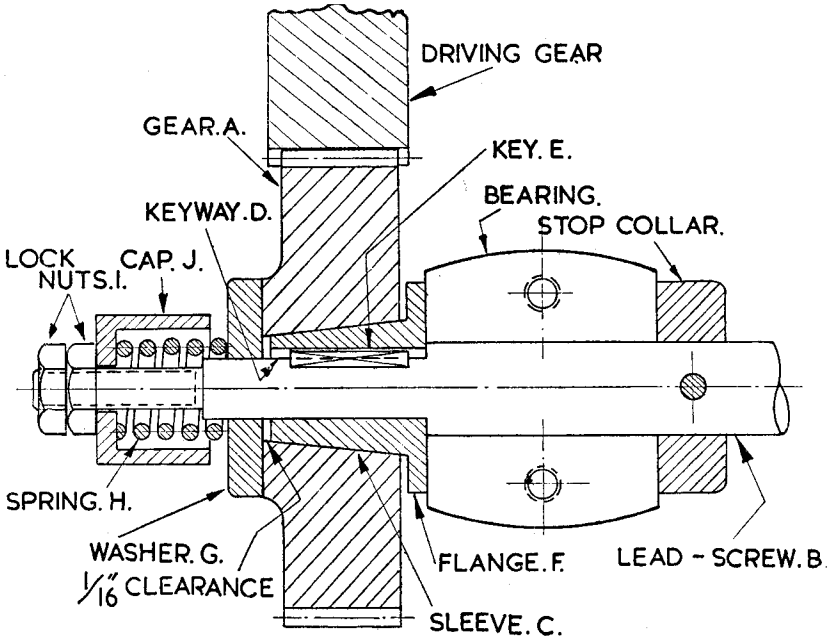
TORQUE CONTROL FOR THE SELF-ACTING FEED

by W. M. Halliday

WITH small centre lathes of the bench type, when turning shouldered shafts, or boring and threading blind holes to precision limits of accuracy on length or depth of hole, etc., or when numbers of identical components have to be produced, it is customary to employ some kind of fixed stop for regulating the lateral traversing movements of the carriage and tool mounted thereon.

With many boring and internal threading operations such timing will be exceedingly tricky, and even with the greatest possible care, errors of judgment are very apt to occur.

Failure to disconnect the leadscrew nut at the precise instant will incur great risk of the carriage being carried too far forward, under power drive, and thus becoming forcibly jammed against the stop block mounted on the bed. If such an



Such stops generally comprise a simple solid block affixed by set-screws, or other convenient clamps, to the guide shears of the lathe bed, or to some adjacent stationary portion of the machine frame.

A stop of this kind will be arranged for direct abutment with the machine carriage when the latter has reached a predetermined point throughout its movement along the bed. When this point has been reached, the carriage and cutting tool will be positively arrested against further movement, so that blind holes or shoulders will be uniformly reproduced to exactly the same depth, or length as the case may be, over repeated operations.

Stop blocks of this character when installed will prove satisfactory, provided considerable care is exercised by the machine operator in timing the disengagement of the leadscrew drive, so that power feed to the carriage will be cut off at the critical moment.

occurrence takes place, there will be considerable danger of inflicting serious damage to some portion of the machine mechanism, *viz.* the threads of the leadscrew or its nut may be damaged ; the bearing brackets in which the leadscrew is mounted may be torn off their seatings and broken ; the teeth of the spur gear wheel on the leadscrew may be stripped, or those of mating gears in the train, are but a few of the probable breakdowns liable to arise.

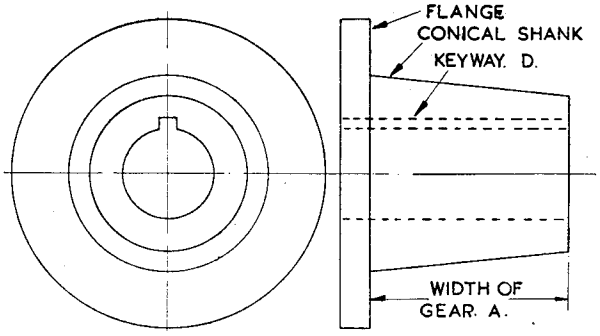
To overcome this sort of hazard and to provide a reliable safeguard for the critical driving mechanism against accidental over-run and jamming of the carriage, the following simple adaptation will be found extremely useful.

The diagrams fully illustrate the simple, effective and inexpensive character of these simple modifications, and also show the design and construction of the few additional members required.

The gear wheel *A* is removed from the shank

end of the leadscrew *B*, and is set up to run concentrically in the lathe in order that the hole may be enlarged in diameter and formed slightly tapered as shown.

An angle of approximately 5 to 7½ deg. per side will be found quite suitable. The surfaces of this taper hole should be smooth and flat.



This new hole should, of course, be machined exactly concentric with the original hole, or with the outside diameter of the wheel, and moreover the diameter should be sufficiently large to remove completely the keyway initially formed in the smaller parallel bore.

A new component is required for mating with this modified gear, in the shape of the headed mild-steel sleeve *C*. This member has a plain parallel bore to suit the shank portion of the leadscrew on which it has to be affixed. A keyway *D* is provided at one side of the bore for engagement with feather key *E* in the leadscrew. The sleeve is to be a tight press fit on the screw shank.

The exterior of the shank of the sleeve *C* is turned conical to the same angle as that of the tapered hole in gear *A*. The member is also provided with a narrow enlarged head or flange *F* at one end, this coinciding with the largest diameter portion of the tapered shank, as indicated in the sketch.

The tapered portions of gear and sleeve should be carefully fitted together, either by scraping or lapping to obtain the closest and smoothest fit. With the two tapered portions thus closely engaged, there should be approximately $\frac{1}{16}$ in. clearance between the head and the rear face of the gear wheel *A*. The opposite end-face of the sleeve should lie below the front face of the gear by a similar amount.

A thick hardened steel circular washer *G* is mounted at the front end of the gear. The washer has a plain bored hole made a sliding fit over the shank of the leadscrew.

The washer should have both side faces ground perfectly flat and parallel with each other, whilst the outside diameter should be made about 1½ to 2 times that of the small end of the shank of sleeve *C*. A stiff compression spring *H* is situated immediately behind this washer encircling the leadscrew, and its purpose is to hold the washer very smartly against the face of the gear wheel *A*.

Two identical hexagon lock-nuts *I* are screwed on to the threaded end portion of the leadscrew shank, to take the place of the usual circular ring-nut formerly employed to retain the gear in place. Interposed between these lock-nuts and the spring is the hollow circular cap *J* bored through its left-hand end wall to be a sliding fit over the shank of the leadscrew, and a hollow recess at the opposite end to fit easily over the outside of the spring *H*.

When installing these various adapted working elements after the manner depicted in the sectioned sketch and before commencing to use same, the two lock-nuts *I* will have to be adjusted so that the spring is compressed sufficiently to force the gear wheel *A* tightly on to the conical shank of sleeve *C*

This will create a strong frictional grip between the two members, which ordinarily will be adequate to maintain the drive to the leadscrew for all cutting operations.

Instantly Disconnected

With the members adjusted in this manner, immediately some additional resistance is encountered by the leadscrew, as would arise from a jammed carriage and stop block, the drive will be instantly disconnected between gear and sleeve, with the former continuing to rotate with the rest of the gear train, and the sleeve and leadscrew, etc., remaining stationary until the resistance has been eliminated.

Thus, even with a severely fierce jamming of the lathe carriage, no damage would be inflicted on the leadscrew, or its nut, or the gears driving same.

The lock-nuts *I* may, of course, be easily adjusted to impart any desired degree of overloading slipping pressure, such as may be required, for example, if particularly heavy cuts were being taken.

On the other hand, they may be set to give safe slippage to the driving gears and leadscrew, etc., at a very light load, such as would be required for example, with internal threading.

Avoiding Errors

This simple safety mechanism will prove particularly advantageous when applied to various types of bench lathes, and will prove the means of not only avoiding serious damage to machine parts, but the elimination of numerous errors in the finished component which otherwise might occur.

The operator, too, will be enabled to handle the machine with much greater assurance when boring or threading blind holes, or turning shafts having shoulders disposed within very close limits.

Adoption of the modification will also permit the power traverse to be engaged for the full length of the cut, instead of the usual practice of stopping power feed about ⅛ in. short of the required length, and finishing this remaining portion by slow and gentle hand feed. Thus, operating time will be economised to considerable advantage when a number of components have to be produced.

Attractions and Features
at the 1951 Model Engineer Exhibition

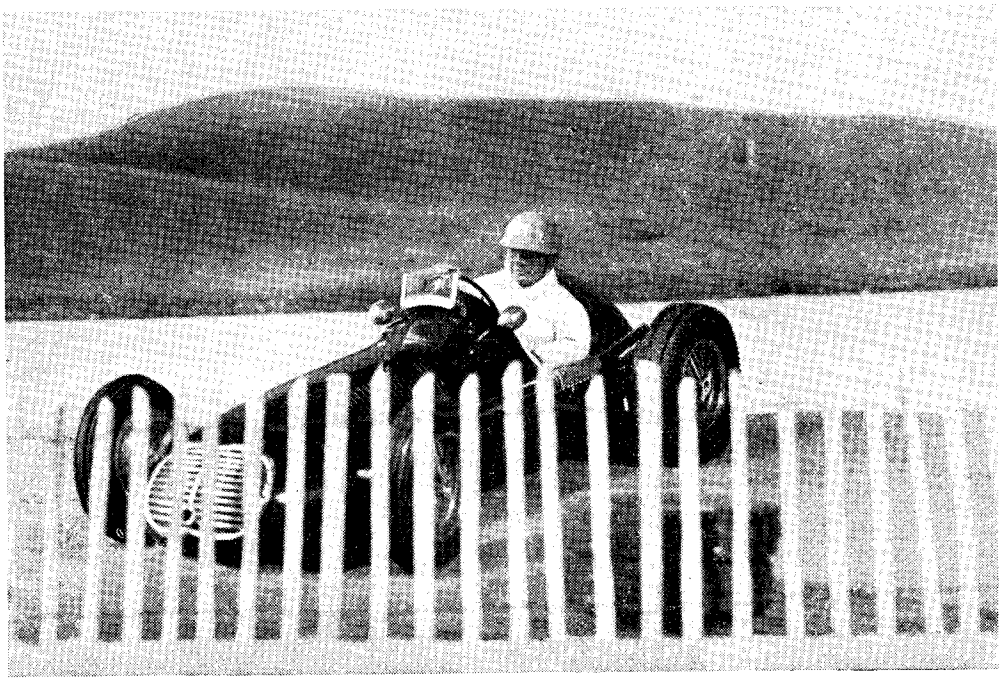
A Miniature Grand Prix

AN outstanding feature at this year's Exhibition is the miniature Grand Prix circuit on which will be seen, for the first time in any country, model motor racing on a super-detailed track by authentic scale models.

Thousands of visitors in past years have seen model cars, powered by internal combustion engines, undergoing time trials on the Grand Circular track, and until recently this was presented to the public as model car racing. Although in itself a spectacle of no mean attraction, its scope was limited by the necessity for keeping the model to a circular course by means of a centre pivot and restraining line. The major disadvantage was that only one model could be run at a time.

Miniature Grand Prix is a complete breakaway from the old system of model car racing, and there are absolutely no limits to its possibilities as a replica of the real thing. At the "M.E." Exhibition, for instance the track consists of right and left bends, both slow and of the hair-pinned variety, climbing and descending turns and realistic gradients which will test to the full the flexibility of the cars and their engines. These cars are all scale models of well-known Grand-Prix types, such as the B.R.M., Maserati, Alfa Romeo, Ferrari, etc., and throughout the period of the show they will be racing, three at a time, three heats and a final, just as one might expect to see on a full-size track. The circuit itself is suitably decorated with all the relevant effects including railings, bunting, straw bales, paddock, pits, foot bridges and what have you, and we hope that the atmosphere will be further enriched by an occasional visit by some well-known Grand Prix drivers. This is one of the most sensational miniature attractions ever presented to the public.

Our illustration gives a good idea of the authentic effect possible with this type of circuit, for which we predict a big future both in this country and abroad.



One of H. C. Baigent's scale-model Maseratis, replete with scale-model driver, caught by the camera broadsiding in the Grand Prix manner

DEMONSTRATIONS OF MODEL CONSTRUCTION

IN the past, so many visitors, looking at the competition models have remarked "I can't understand how anyone could have made this model" that we have now introduced a part of the Exhibition where experts can demonstrate the methods used for making a model. This year this demonstration area is in the centre of the hall, between the two competition display stands, and we feel sure even the most expert model maker will find some new method of construction which will interest him. There will be demonstrations by the Association of Ship Model Societies, showing the construction of historical models, The Model Yachting Association with various types of hull construction, The Model Power Boat Association, demonstrating the use of different propulsion units, The Society of Model Aeronautical Engineers with model aircraft construction. Experts will also show metal turning and gear cutting, soldering, tin-smithing and riveting, and "kitchen table" brazing. Members of the public who are interested in this section are encouraged to ask questions.

Dinghy Building

The 2nd Leytonstone Sea Scouts will show how a full-sized sailing dinghy can be built rapidly with a few simple tools. During the Exhibition they will set up the dinghy's frame, plank the hull, finish the hull and fit the deck and make all the necessary fittings within 10 days. This operation has only been possible with kind co-operation of *Yachting World*, who are supplying the plans of the Bell Woodworking Company who are giving the wood. We feel that many model engineers in small home workshops will be attracted by the ease with which this dinghy is completed and will be encouraged to make one themselves.

MARINE ACTIVITIES

ONE of the main features of this year's Exhibition is a large water tank, in which marine models of every description are demonstrated. A fine model of s.s. *Port Brisbane*, constructed by Dr. Stansfeld, is shown coming into dock, securing alongside and unloading her cargo. These operations are controlled by submarine sound transmission. The model is built exactly to scale, the hull being constructed of plates similar in type to those used in full-sized construction. All the internal fittings and machinery on each deck are exactly to scale and we believe this is the first time that a model constructed in such detail throughout will float on her designed waterline and operate exactly like a real ship.

Another model which should prove of great interest is a destroyer, constructed by Mr. Norman Ough, who is world-renowned for his models of naval ships. This model, which also is perfect in every detail, is controlled by radio, powered by scale steam turbine engines, guns can fire actual shells by radio, and signals can be made from the mast head, also by radio.

The Model Power Boat Association will be demonstrating their fine collection of models of all types. They hope to carry out steering competitions, and trials with boats under power. Anyone interested in prototypes should not miss this demonstration and members of this Association will be glad to answer questions and put anyone in touch with local clubs.

The Radio Controlled Models Society, whose main concern is the development of radio control, have constructed ten models and fitted them with the latest receiving sets and actuating mechanisms. This society has very kindly arranged for four or five miniature speed boats, which also are controlled by radio, to be operated by the public from outside the tank. Here, then, is an opportunity to see for oneself how simple and effective this type of control is.

One of the leading exponents of radio control, Mr. Honnest Redlich, will demonstrate two sailing boats controlled by radio. These boats will be made to run, reach and tack in the tank with wind artificially produced under full control by radio. We feel that this demonstration will show many of the yacht racing enthusiasts the enjoyment of handling a sailing boat without the expense of buying a full-sized boat.

WORKING MODEL RAILWAY

A "OO"-GAUGE model railway, designed and built by members of the Ilford and West Essex Model Railway Club, will be seen working. The layout has been considerably altered since it was last seen in public, and now comprises up and down roads with (*a*) a passing station with bays for terminal working in each direction, together with goods yard and locomotive depot, and (*b*) a wayside station with outside passing loop and provision for terminating and turning trains in each direction. In addition, there is a two-road locomotive shed, coaling-stage and a semi-automatic, electrically operated turntable for the turning of tender locomotives. There are also carriage and goods sidings.

The locomotives are operated by 12-volt d.c. supply, on the split-potential system, from a mains power unit. Points are operated manually and by a.c. motor with route protective switching. Signalling, which is automatic, is operated by a 4½-volt d.c. supply.

For full operation of the layout, four operators are required, two at each station, one for controlling main-line traffic and the other for handling yard and locomotive working.

The exhibit is the result of the combined efforts of members of the club, and many of the locomotives and individual items of rolling stock have been specially built for this year's MODEL ENGINEER Exhibition.

WHAT TO SEE

AT THE 1951 "MODEL ENGINEER" EXHIBITION

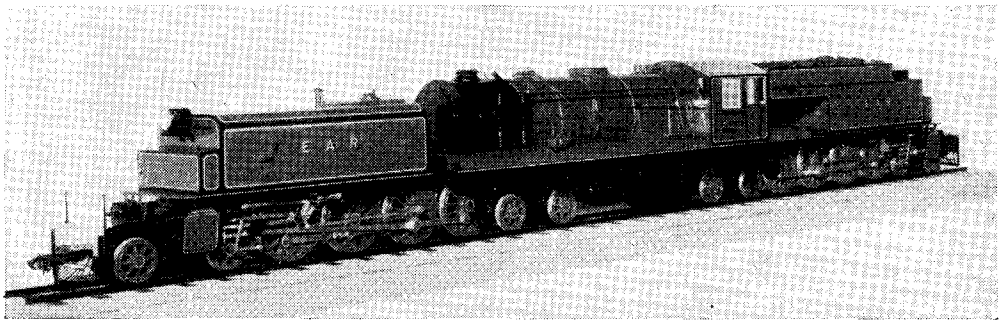
Interesting Trade Exhibits

Here are most of the trade stand-holders at this year's Exhibition, with a brief summary of the principal exhibits of each. You will note many new names, that is, new to the "M.E." Exhibition, which appear intermingled with those of our old friends; to one and all we would like to express a special welcome to this 1951 Festival Year show.

Despite the hazardous conditions which prevail in our country today and the attendant difficulties with regard to purchase tax, material shortage, export commitments, etc., the trade have come up again with a most pleasing assortment of goods and appliances, the quality and variety of which cannot fail to win the approbation of our visitors.

At all these stands, you will find attendants, and often experts, eager to assist you in every way possible. Please do not hesitate to ask their advice on any subject in which they specialise they are here in the interest of your hobby and you will find them only too happy to oblige.

Bassett-Lowke Ltd., 16-20, St. Andrews Street, Northampton. Here will be found a selection of locomotives (steam, clockwork and electric drive) and model railway accessories in various gauges. Also, there will be a wide range of castings, parts and fittings for model locomotives, traction engines and stationary engines, together with examples of the famous Bassett-Lowke boiler fittings. Scale model ships, ships' fittings, as well as certain steam, clockwork and electric machinery will be on display. Bassett-Lowke products are so widely known as to need no special introduction to our readers and visitors.



A ¼ in. to 1 ft. model of a 4-8-4 4-8-4 Beyer Garratt locomotive recently completed by Messrs Bassett-Lowke Ltd.

Cray Model Craft, 70, Wellington Road, Orpington, Kent. This stand will be displaying a remarkable variety of products. A model railway layout will show what can be done with Rivarossi and other proprietary articles shown on the stand. Graham Farish locomotives, Pullman cars, goods wagons and track. "O" gauge railway goods including some fine models of locomotives of past days and old Brighton stock. There will also be many model aircraft items including Veron kits, made-up models, various aircraft sundries, Jetex and E.D. engines.

Workshop equipment, including the "EW" lathe and accessories, Myford lathe and accessories, Pool milling machine, Champion drilling machine, Flexispeed lathes and milling machines, and Adept lathes and shapers, will attract all who own, or are thinking of fitting up home workshops. A useful variety of Burnerd chucks, usual small tools and workshop sundries will be displayed for inspection and selection.

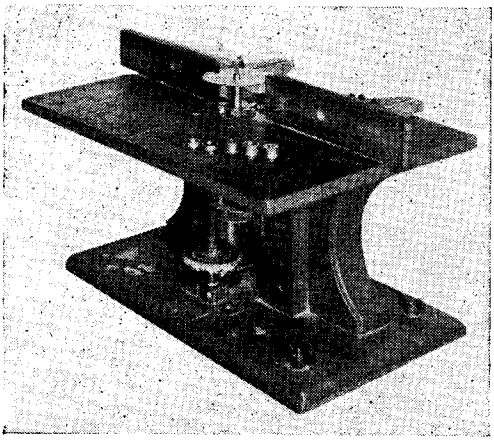
Electrical goods will include Brook motors and Wolf electrical equipment.

P. S. Fisher, 6, Station Yard, Twickenham, Middlesex. This is another stand on which will be displayed a large variety of manufactures to appeal to most visitors. A model railway layout will demonstrate one of the largest ranges of "OO"-gauge equipment, sets and accessories made by Rivarossi ever to be seen in this country; there are 29 sets, including the ingenious little self-steering trolleybus. Other items will be locomotive kits, track kits, points and miniature buildings.

Of more general interest, there will be found here such products as Jetex engines, kits and accessories, E.D. engines, radio-control sets; Modelspan, Dunlop Rubber and Bat specialities; ship and galleon fittings; Ever-Ready Underground train sets and motors; Truline station buildings; CCW coach bogies; Crescent rail-

way accessories ; O-My (Celestor products) and Britfix cements ; Croid glue ; Perspex cement ; Solarbo balsa wood, etc.

Ahor Handy Machines (S.E.M.I.S.), 25, Bis Rue Emile Duclaux, Seresnes (Seine), France. A very ingenious range of bench woodworking machines form a feature of this stand.



One of the Ahor handy machines

They include small circular saw benches, jointing machines with capacities up to 6 in. and 9 in., vertical spindle moulding machines, mortising machines, band-saws and woodturning lathes.

Formo Products Ltd. (agents for Graham Farish Ltd.), Mason's Hill, Bromley, Kent. The well-known Graham Farish " OO "-gauge model railways and accessories will be featured on this stand. The famous locomotives, rolling stock, track and useful accessories can be seen together with examples of this firm's electrical items designed specially for their model railways.

Kennion Bros (Hertford) Ltd., 2, Railway Place, Hertford. Catering largely for the miniature steam locomotive enthusiast, as well as for the seeker after workshop equipment, this firm will be displaying blueprints and castings for most of the locomotives designed by " L.B.S.C." There will also be a full range of parts for the firm's own 5-in. gauge 0-6-0 tank engine widely known as *Butch.*

The firm specialises in fine-thread taps and dies so often needed by model engineers ; they include 60, 40, 32 and 26 Whitworth, B.S.F. and B.A. threads. There are also some special pilot taps for cutting threads in union nuts, glands, etc. As makers of miniature locomotive boilers, Kennion Bros. have a fine reputation, and samples of this sort of work will be on view.

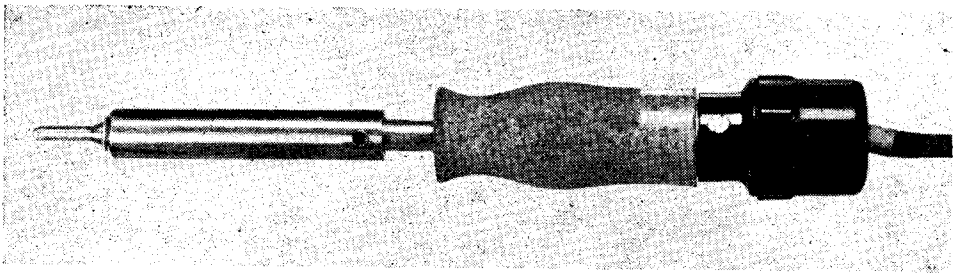
This list of products would not be complete without mention of the 45-deg. and 90-deg. boring-bars, between-centre and double-ended boring-bars and the special double-ended tailstock dieholders.

Walkers & Holtzapffel Ltd., 61, Baker Street, London, W.1. Specialists in locomotives, coaches, rolling stock, track, points and all kinds of components for model railways, chiefly for " OO " and " O " gauges, this firm will be showing selections from their large stock. The famous " Romford " electric mechanisms and motor bogies are among the specialities to be found among the many items displayed.

Percival Marshall & Co. Ltd., 23, Great Queen Street, London, W.C.2. The proprietors and publishers of THE MODEL ENGINEER, *The Model Railway News, Model Ships and Power Boats* and *Model Aircraft* need no introduction to our readers, for we have catered for the needs of model engineers' libraries for 53 years and more ; in addition, we are, of course, the organisers of THE MODEL ENGINEER Exhibition.

Our stands will contain copies of our various periodicals, our many technical handbooks and very wide selection of drawings covering miniature locomotives, traction engines, ships, aircraft, internal combustion engines and many other things which are of interest to the amateur technician.

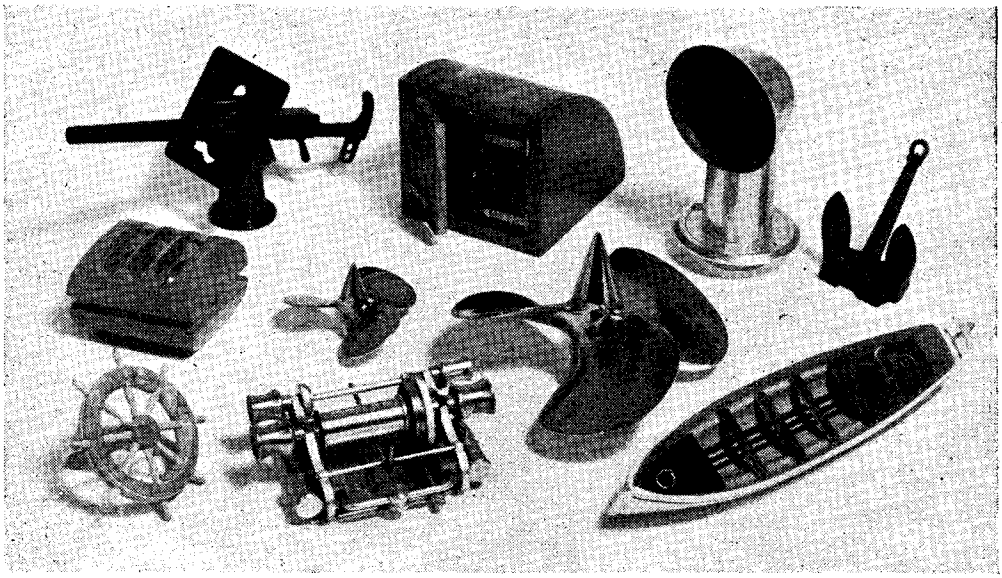
Among the new items to be seen on this stand we would particularly draw attention to the new *M.E. Lathe Manual* by Edgar T. Westbury, which makes its first appearance at this Exhibition. While this book does not supplant the well-known previous hand-books *The Beginner's Guide to the Lathe* and *Practical Lessons in Metal Turning,* it deals with the technique of lathe operation in a much more detailed manner, having been produced to meet the growing needs of our many readers who are taking up lathe work,



A soldering iron by Messrs. Wallace Engineering Supplies Ltd

either in an amateur or professional capacity. We claim this book to be the most comprehensive work on small lathe practice yet published.

The Wallace Engineering Supplies Ltd., Faraday House, 17, Todd Street, Manchester 3. This firm exhibits a wide range of tools suitable for model engineers and instrument makers, including measuring instruments, electrically driven hand-tools, soldering irons, embossing tools, surface plates and electrical components, such as relays, Neon indicator lamps and test apparatus.



A selection of model ship fittings by the Web Fitting Company

The Web Fitting Company, 204, High Road, Wood Green, N.22. Among the items on the sample display stand will be found a selection of the products of the above company, which claims to make the greatest range of fittings and parts in the country. The display will be but a fraction of the complete range, which includes fittings for model yachts, boats, ships, liners, warships, boilers, etc. The firm also manufactures models for inventors, for industrial and scientific research, and repetition component parts to drawings, in large or small quantities.

Hamblings, 10, Cecil Court, Charing Cross Road, London, W.C.2. The specialists in standard "OO"-gauge model railways and all sorts of relevant accessories. This firm's products are made in their own up-to-date factory and show a high standard of precision. They include complete locomotives and rolling stock, sheet-metal locomotive bodies ready for assembling to mechanisms, track, track parts and an ingenious track-laying tool. There are large numbers of excellent die-castings ranging from elaborately detailed coach bogie frames to torpedo ventilators. All are produced to 4-mm. scale, but all relevant visible detail is well reproduced. New items are added to the firm's specialities as often as circumstances permit, and the miniature reproductions of British Railways latest standard coaches are among the best of the more recent additions.

Messrs. Black & Decker Ltd., Harmondsworth, Middx. The range of Handy-Utility electrically-driven tools which have recently been the subject of a detailed review in THE MODEL ENGINEER will be exhibited on this stand. The basic form of the Handy Utility tool is an electric hand-drill incorporating a powerful universal motor with reduction gear and control switch, adaptable to be used either in the hand or fitted to a vertical stand with fitted lever to form a sensitive drilling machine, or mounted on a horizontal stand to form a tool grinder or polishing head.

Messrs. Braid Bros., 50, Birchwood Avenue, Hackbridge, Surrey. This display features the castings and accessories for the "Busy Bee," 50 c.c. auxilliary engine which is now being described in THE MODEL ENGINEER, and also components for the construction of home refrigerators, including absorption units, compressors, condensers, valves and other fittings.

Messrs. Buck & Ryan Ltd., 310-312, Euston Road, London, N.W.1. Always one of the most important stands at the "M.E." Exhibition, this will feature the usual display of high quality and up-to-date engineers' tools. These include hand-tools and measuring instruments for engineers, machine tools and accessories, electric hand-tools and many other items of special interest to all model engineers.

Chloride Batteries Ltd., Exide Works, Nr. Manchester. The well-known Exide accumulators and Drydex dry batteries form the principle feature of this stand. A range of batteries suitable for electrically driven models, and models powered by these batteries will also be exhibited.

Messrs. E. W. Cowell, 7A, Sydney Road, Watford, Herts. The specialities of this firm are small machine tools and castings for their construction, including bench drilling machines, hand-shaping machines and machine vices, and samples of these products will be featured in their display.

Craftsmanship Models Ltd., Norfolk Road Works, Ipswich. Most readers of THE MODEL ENGINEER are now familiar with Craftsmanship products, which include accurate and highly finished die-castings for the construction of several of the models which have been described in THE MODEL ENGINEER, also locomotive castings and fittings for steam engines and boilers.

R. J. Deaves, 57, Tennyson Road, Small Heath, Birmingham, 10. A demonstration of an ingenious combination tool will be given on this stand. This tool, of simple and inexpensive construction, incorporates a sharpener for knives, scissors and other fine tools, and also a glass cutter.

Iliffe & Sons Ltd., Dorset House, Stamford Street, S.E.1. These well-known publishers exhibit samples of their periodicals, including the *Amateur Photographer*, *The Autocar*, *Flight*, *The Motor Cycle*, *Wireless World*, *Yachting World*, also a wide range of technical books on various subjects.

Myford Engineering Co. Ltd., Neville Works, Beeston, Notts. The special feature of this stand will again be practical demonstrations of the Myford lathes, including the M.L.7 which is now established as a firm favourite among model engineers, and one of the closest practical approaches yet achieved to the "ideal" model engineer's lathe. The M.L.8 woodworking lathe with its many attachments for sawing, planing and sanding, making it into practically a complete universal woodworking machine, will also be demonstrated, and another machine which has not previously appeared at the "M.E." Exhibition is the M.G.9 cylindrical grinder, a very handy precision machine for dealing with small shafts and similar components, either in the factory, the tool room, or instrument shop. Sections of these machines to show the details of their construction will be on view, and a skilled staff will be in attendance, not only to demonstrate the machines, but also to answer any technical queries and assist users of the machines to get the best possible service from them.

H. Rollet & Co. Ltd., 6, Chesham Place, London, S.W.1. The products of this firm consist of non-ferrous metals, which are stocked in a wide range of sizes and sections. A reproduction of a part of the firm's warehouse, showing the various sections and types of material, will be featured on the stand, and also a model of the cutting shop where the customer's material can be cut to required widths.

Messrs. Stuart Turner Ltd., Henley-on-Thames, Oxon. Of all the firms in the model engineering supply trade, none is better known than that of Stuart Turner, which for nearly half a century has catered for the requirements of constructors of high-class models by supplying castings and all types of fittings for marine, stationary and locomotive models. The well-known Stuart products will be shown and demonstrated on this stand, including centrifugal and lubricating pumps, steam engines, boilers and a wide variety of castings.

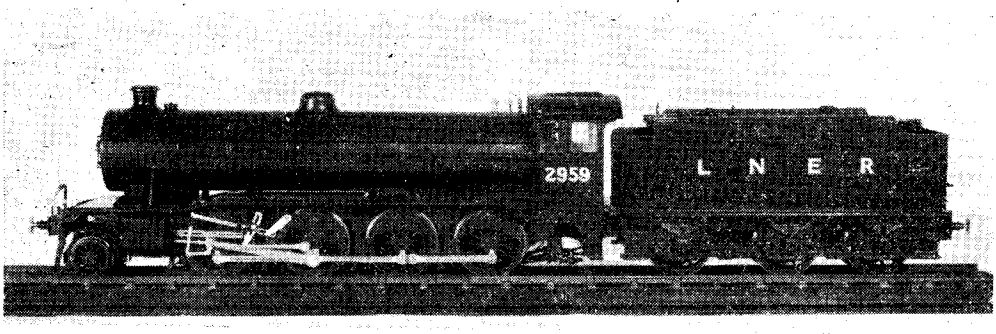
J. F. Stringer & Co. Ltd., Express Works, Orleston Road, N.7. The E.W. lathe, which was introduced two years ago and has already become extremely popular among model engineers is featured in this display. This lathe can be obtained in a simple basic form with direct driven 3-speed mandrel, sliding tailstock and compound slide rest, and improved by the addition of further components, such as leadscrew, complete screw-cutting gear and back-gear to give increased speed range. In either form, it is sound and accurate in construction and moderately priced.

Electronic Developments (Surrey) Ltd., 18, Villiers Road, Kingston-on-Thames, Surrey, have long been known as manufacturers of a very successful line of model compression-ignition engines and their development of an excellent radio-control unit has placed them in an enviable position in the trade. This year on Stand No. 4, they will be exhibiting the latest additions to their range, including model aircraft, radio-controlled model yachts, radio-controlled motor boats and model cars. As well as their engines and radio-control units, they will also carry comprehensive ranges of accessories and spares.

Multicraft Tools, 29, Bolsover Street, London, W.1, will show on Stand No. 33, their range of Multicraft precision cutters, the Hobbyist Craftknife, Multicraft sawframe, sanding block and plane, chisel files and other accessories which will be found useful in many branches of model engineering.

Rozalex Limited, 10, Norfolk Street, Manchester, 2, on Stand 34, are again showing their well-known grease solvent. Rozalex is an established preparation which is becoming widely used in industry and will be found a useful ally in the home workshop.

James Rogerson Ltd., 30, Chertsey Street, Guildford. This stand will contain a small track layout in "OO"-gauge to demonstrate locomotives built by this firm. One of these engines is a miniature L.M.S. 0-4-0 saddle-tank which has already run more than 300 actual miles without anything going wrong or requiring attention. Another very interesting little engine is a 0-4-0 North British tender goods engine, the full-size edition of which was very small, but did a great



A scale model locomotive by Messrs. James Rogerson Ltd.

deal of useful work during more than 50 years existence. The miniature demonstrates convincingly that a very small prototype reproduced to scale in "OO" gauge is no handicap to an adequate power output combined with the ability to negotiate very sharp curves when hauling a realistic load.

Other specialities on view will include Rogerson's special point motors, die-cast wheels for wagons and coaches and die-cast axleguards. The model railway enthusiast in particular will find much to interest him on this stand.

On a sample display stand the **Overseas Engineering Co. Ltd.,** 194-200, Bishopsgate, E.C.2, will display their miniature compressor powered by electric motor, complete with drilling, grinding and buffing attachments. This was recently reviewed in the pages of THE MODEL ENGINEER and there is little doubt that it will be found by many to be an extremely handy and reasonably priced article.

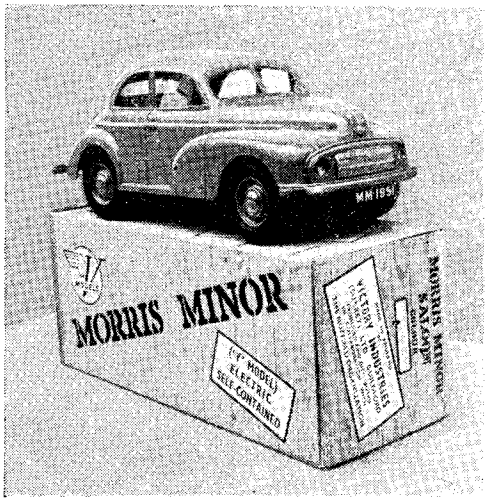
On Stand No. 37, **Z.N. Motors Ltd.,** 904, Harrow Road, Willesden, N.W.10, the well-known pioneers in the model race car field, have recently added to their line an attractive 5 c.c. version of the B.R.M., and this, together with a wide range of components and their very excellent model aircraft wheels will be on show.

Victory Industries (Surrey) Ltd., Barfax Works, Worplesdon Road, Guildford, have taken a sample display stand on which they will show their popular miniature electric motors, together with electric scale replicas of the new 1952 models of the Vauxhall Velox and Morris Minor. These are both very attractive miniatures, and far ahead, in appearance, of anything we have seen to date.

Another sample display stand, **Donald Ross & Partners Ltd.,** 1, Arlington Road, London, N.W.1, will be showing their Twinner portable electric welding and soldering machine, demonstrations of which will be carried out daily throughout the period of the Exhibition. Here is an outfit which will appeal to model engineers whose branch of the hobby necessitates the use of welding plant. Its very compactness renders it one of the most adaptable machines for home use that has ever been designed.

Admiralty. In addition to the usual display of naval equipment and recruiting literature, it is hoped that this year there will be on view specimens of the plans which the Admiralty publish of a number of their vessels, both large and small. These will be of the greatest interest to model makers, especially to the maker of miniature waterline models. Also the maker of larger models will be glad of authentic information, regarding the above water form and the superstructure of his model.

The War Office, (P.R.I.a), Whitehall, S.W.1. Models made by craftsmen in the Army will be seen on this stand. There is scope and encouragement for model engineering and other hobbies in the Regular Army, and the enthusiast is allowed full facilities for his favourite pursuit, including the use of workshops with high class tools and equipment.



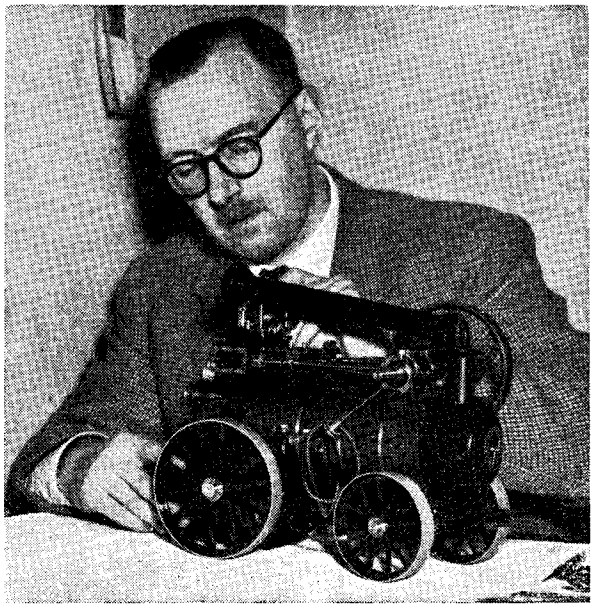
A model Morris Minor on top of its packing crate, by the Victory Industries (Surrey) Ltd.

On Stand No. 24, the **Royal Air Force,** Air Ministry Information Division (Inf.1.(b)), Parliament Square House, Parliament Street, S.W.1, will be displaying the 6 ft. model of the Canberra Mark II twin-jet light bomber which, early this year, made the fastest flight ever achieved across the Atlantic. This aircraft, which is going into squadron service this summer, flew the 2,080 miles from Aldergrove, Northern Ireland, to Gander, Newfoundland, in 4 hours 37 minutes at an average speed of 450 m.p.h. It was the first jet aircraft to cross the Atlantic without refuelling.

With the expansion of the Royal Air Force, there are greatly increased opportunities for young men to train as air-crew, while on the ground, there are many interesting technical and administrative posts open to direct entrants, or through the Royal Air Force apprenticeship scheme. Details of the various regular and reserve formations in the R.A.F., and also of the apprentices schemes may be obtained here.

General Engineering Section

THE standard of the exhibits in this section appears to be high, and there is also quite a good variety. One of the most interesting models in this section is a twin-cylinder coal-fired portable engine, by Mr. Beaumont, of King's Lynn. This engine was made without drawings, from information obtained from published prints and engravings, and is entirely fabricated, with the exception of the flywheel, which was made from a casting. its construction occupied approximately 1,800 working hours.



Mr. Beaumont, of King's Lynn, with his model portable engine

Mr. R. F. W. Jarvis, of High Wycombe, exhibits a working model of an 80 in. Cornish pumping engine of the type developed by Richard Trevithick and his contemporaries, from the original Watt pumping engine.

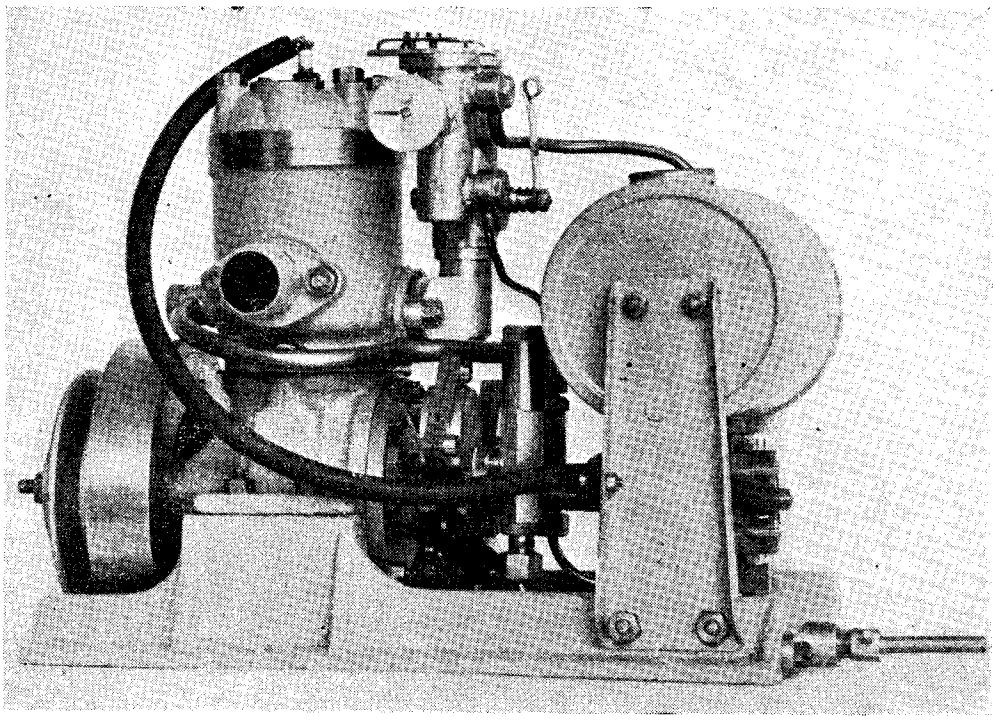
A very unusual model is the experimental jet turbine unit by Mr. C. H. Toogood, of Sudbury, which is intended as the power plant for a twin-screw model boat. Mr. Toogood has made a speciality of experimental models, and has exhibited various engines of his own design in previous " M.E." Exhibitions. This model is a combination of the pulse resonance type of jet engine and a turbine of the impulse type. It embodies a combustion chamber with a petal type inlet valve, discharging to the jet of the turbine rotor. There is a blower unit on each end of the shaft to supply air to the combustion chamber. Reduction gears are fitted, one on each side of the turbine, and are of 25:1 reduction ratio. This unit is said to have worked fairly satisfactory in initial trials, but is still giving a certain amount of teething trouble.

A complete steam-driven electric generating set is exhibited by Mr. E. G. Uphill, of Hounslow. The engine is made from a set of castings by Messrs. Kennion, and the generator and electrical fittings are designed by the constructor. The plant will light six 8-volt lamps running at slow speed.

Mr. H. Chapman, of Lincoln, exhibits a semi-portable horizontal steam engine, the main portion of which is built up from castings, but the bed-plate is built from sheet metal, fabricated by welding.

A large and powerful working model of a Churchill tank, to a scale of 2 in. to the ft., is contributed by Mr. A. T. Tamplin, of Chichester. This is very complete in detail, and is arranged for radio control, including the operation of the turret, gun, and smoke screen. Nearly 2,500 working hours have been put into this model.

Mr. W. S. Sholl, of Broadstairs, contributes three exhibits, the first being a wind-driven electric generator on a lattice tower, having an output of approximately 15 watts, and suitable for the lighting of bungalows, including supply to a radio receiver ; also, two impulse jet turbines, one of which is arranged for variable speed, and reversing without gears, to work on a compressed air line. The other is very small, weighing only 1 oz. and is believed to be the smallest working turbine of its kind in the world. The maker is



The self-contained model marine plant by Mr. R. O. Porter

well known as an experimentallist in this class of motive power.

A model of a universal mechanical excavator with drag-line skimmer and grab, is exhibited by Mr. J. E. Day, of Sevenoaks. A siege gun, mounted on a railway well wagon, complete with full elevating and traversing movements and recoil action, is exhibited by Mr. C. F. Hallett, of Dorchester. Mr. T. R. Martin, of Peckham, S.E.15, contributes a horizontal slow-speed drop-valve mill engine, constructed mainly from scrap material, mostly by cutting from the solid.

Internal Combustion Engines

Mr. R. O. Porter, who is very well known in the model power boat world, exhibits a power plant for a prototype model boat. This consists of a 30 c.c. Stuart two-stroke engine, complete with accessories, on a bed-plate which is designed to fix into the boat by four screws. The accessories include petrol feed and water circulation pumps of the diaphragm type, mounted on the front crankcase cover. Ignition is by means of a miniature magneto, driven through a semi-flexible coupling, and the carburation is by down-draught carburettor. It may be of interest to note that Mr. Porter has, for very many years, been running a somewhat similar unit, though with an older design of two-stroke engine, in his boat *Slickery*, and this power unit was exhibited in the loan section of last year's Exhibition.

Mr. D. G. Cash, of Brighton, contributes a 50 c.c. " Busy Bee " auxiliary engine to the design and instructions which have been published in THE MODEL ENGINEER. This is intended for use as a motive power for a lawn mower. A 10 c.c. engine of the " Channel Island Special " design is exhibited by Mr. C. W. Pedler, of Smethwick. A 15 c.c. Seal engine, intended for marine work, is entered by Mr. T. B. McKee, of Westcliff-on-Sea, and Mr. A. G. Boulting, of Richmond, has entered a compression-ignition engine of 0.1 c.c. to his own design, all parts of which have been machined on a 2½ in. centre lathe.

Non-working scale models

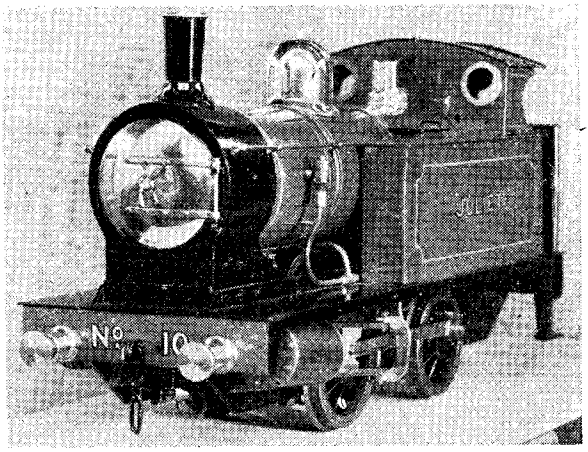
Mr. R. J. Upshall, of Brentford, has constructed a L.C.C. " M " class tram-car to a scale of 4 mm. to 1 ft., and Mr. H. J. P. Hudson, of Finsbury Park, N.4, exhibits a model of a London Tramways current-collecting plough, to a scale of 3 in. to 1 ft.

A modern motor coach to a scale of 1 in. to 1 ft. by Mr. C. A. Bright, of Catford, S.E.6, and a model of a Rolls-Royce touring limousine, to a scale of ⅛ in. to 1 ft., by Mr. S. E. Hamilton, of Esher, are also exhibited.

(*To be continued*)

Steam Locomotives

AMONG the miniature steam locomotives entered for this year's competition, there are some which, for one reason or another, are of more than passing interest. For example, a 3½-in. gauge "Juliet" built by Mr. H. Brown of Haywards Heath, took 3 years and 10 months to build, and is Mr. Brown's *first* attempt at model engineering; he is 64 years old!



A "first attempt" by a 64-year-old enthusiast, Mr. H. Brown

Mr. W. Tucker, of Bramhall, has entered his 3½-in. gauge N.E.R. "V" class Atlantic locomotive, described and illustrated by "L.B.S.C." in our issue for August 16th. To judge from the illustration, this model fully and accurately reproduces the very characteristic appearance of the prototype, but we are sure that Mr. Tucker's workmanship has, at the same time, produced a thoroughly satisfactory *working* unit.

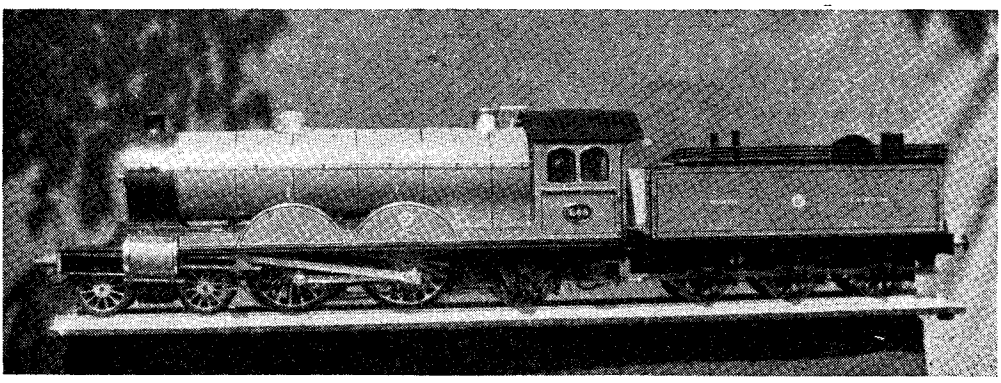
On a larger scale is a 5-in. gauge G.W.R. 4-6-0 mixed traffic engine built by Mr. P. J. E. Spear, of Sutton, Surrey, who has spent three years on it; he is a plastic machine setter aged 24, and would seem, therefore, to possess plenty of enthusiasm.

Another 5-in. gauge locomotive which is even more a demonstration of keen enthusiasm is a G.W.R. "King" class 4-6-0 on the building of which Mr. L. H. Cheesman, of Ricksmansworth, has spent 11 years. The prototype is not one of the easiest to reproduce in miniature, on account of the four cylinders and inside Walschaerts valve-gear, not to mention the truly majestic massiveness that seems so difficult to retain in a small scale version.

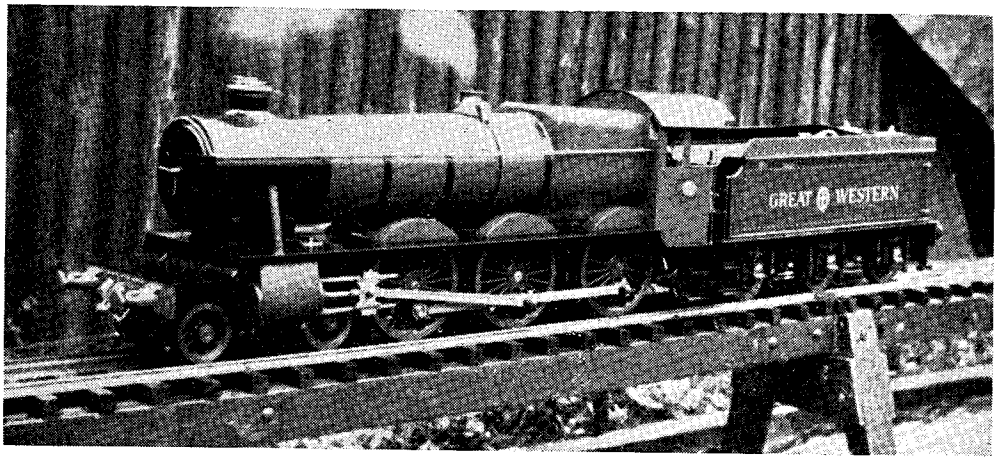
What may well prove to be a "smallest ever" live steam locomotive is the work of someone from whom every "M.E." reader would expect something of the kind. Our old friend, A. A. Sherwood, whose "OO"-gauge four-cylinder Mallet compound locomotive created so much interest last year, has surpassed himself by constructing and exhibiting this year,, a free-lance 2-6-2 *live-steam* locomotive and tender for "OOO"-gauge; that is, 2-mm. scale! We thought he would, some time or other, but did not expect it so soon.

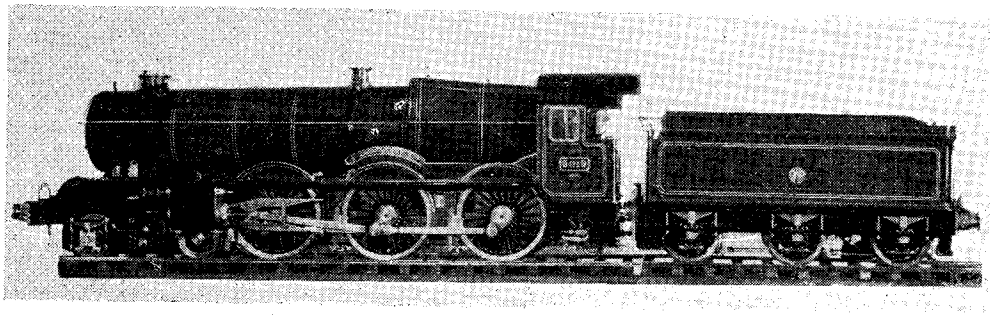
We understand that this extraordinary little engine will run ten laps of a 4-ft. diameter circle of track on one firing. Obviously, in this very small size, coal will not function; so the engine is fired by a specially-designed paraffin blowlamp mounted in the tender.

(To be continued)



Mr. W. Tucker's ¾-in. scale North Eastern "V" Class locomotive is very like its famous prototype

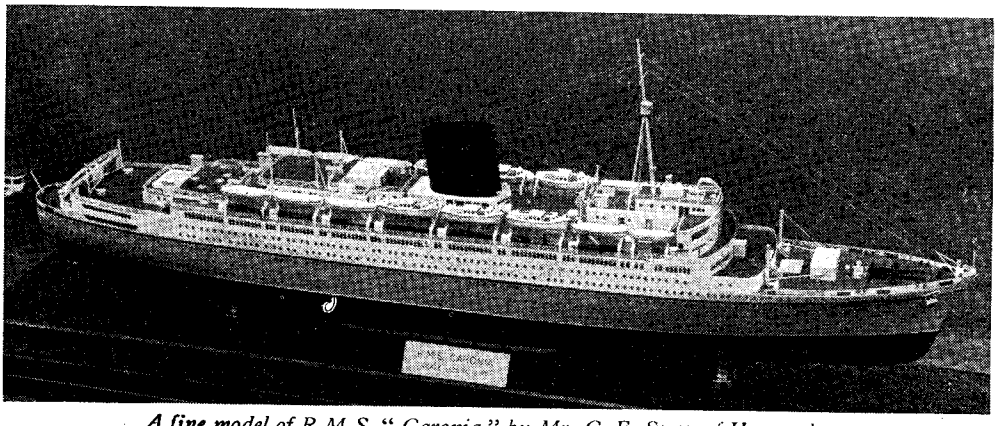




Above—A 5-in. gauge G.W.R. 4-6-0 mixed-traffic locomotive by Mr. P. J. E. Spear
Below—Mr. L. H. Cheesman's 5-in. gauge G.W.R. "King" class engine is an imposing piece of work

Marine Models

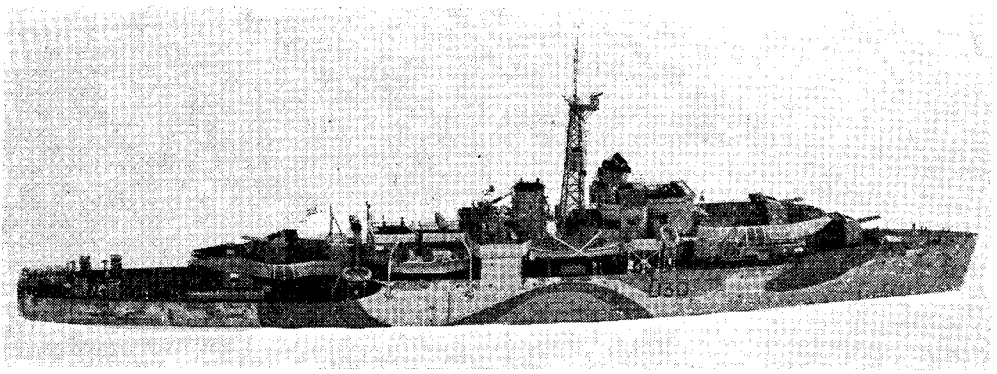
THE ship model section of the Exhibition this year is well up to its usual standard, both as regards the number of models and their quality. In fact, our first impression is that there is a definite improvement in the quality of the models. In describing the models of special



***A fine** model of R.M.S. "Caronia" by Mr. C. F. Stott, of Harpenden*

interest it will, perhaps, be simpler if we take one class at a time, commencing with class "D," Steam and Motor Ships, Non-working. One of the most outstanding is the model of R.M.S. *Caronia* by Mr. C. F. Stott, of Harpenden. This is a nicely proportioned model, well finished and contains a lot of interesting detail. The impressiveness of the original and the easy flowing hull lines are very well shown. Our steward in the Merchant Service. This was made in his cabin on board S.S. *Harrow* and is a very nice full hulled model.

Mr. F. W. Crudass, of Wimbledon, S.W.19, has sent in a waterline model of H.M.S. *Mermaid*. Although this is the first time Mr. Crudass has sent a model to our Exhibition he is obviously a modeller of some experience, as will be seen from our photograph. Our picture was taken



Mr. Crudass's waterline model of H.M.S. "Mermaid"

photograph gives one a good idea of this fine model.

Another model of note, or rather a pair of models, are those sent in by Mr. C. N. Taylor, of Gosport. These are of the M.V. *Portsmouth*, a modern collier, and M.V. *Southsea*, a passenger vessel on the Isle of Wight service. Both are to the scale of 1 in. = 25 ft. The wood used for the hulls has been taken from the *Implacable*, the *Archibald Russell* and the *Aquitania*; being, so to speak, on the spot, Mr. Taylor is favourably placed for obtaining souvenirs of vessels being dismantled or broken up. As in all Mr. Taylor's models the standard is very high and this pair is quite up to his usual workmanship.

An Unusual Prototype

Another interesting model is the scenic model of the Whale Catcher, *Southern Wheeler*, by Mr. R. V. Shelton, of Dunstable. It might be mentioned that these three gentlemen are regular exhibitors at our annual Exhibition and their models are invariably of a very high standard. Mr. Shelton's model is built by his usual method, which consists of cardboard ribs and frames and Bristol board plating. This is an unusual prototype and is full of interesting detail which is carefully reproduced in the model. The sea setting adds to its realism. The scale is 1/10 in. = 1 ft.

The model vessel *St. Essylt* is one of the most striking of modern cargo liners and is deservedly popular with model makers. An interesting model of this ship has been sent in by Mr. James A. Brayne, of Barry, Glam., a chief before the anchor, winch was fitted and before the twin Oerlikon mounting was added to the quarter deck. Other small details were still missing at the time. This is a very fine model, the details of the complicated superstructure being very well worked out. The model is based on photographs obtained from the Imperial War Museum, and the builder is to be congratulated on a very satisfactory result.

Mr. Harry Butcher, of Old Portsmouth, has a waterline model of the M.V. *Portsmouth* which is also the subject of one of Mr. Taylor's models. This is to a slightly larger scale than Mr. Taylor's model, namely, $\frac{1}{16}$ in. = 1 ft., and the comparison between the two models is interesting.

(To be continued)